FCC PART 15.247

TEST REPORT

For

The House of Marley.LLC

3000 Pontiac Trail Commerce Township, MI 48390 USA

FCC ID: PVBEM-EMFH041

Report Type:	**Product Type:**
Original Report	Liberate XLBT

Test Engineer:	Mike Hu
Report Number:	RSZ140327801-00A
Report Date:	2014-05-15
Reviewed By:	Jimmy Xiao RF Engineer
Prepared By:	Bay Area Compliance Laboratories Corp. (Shenzhen) 6/F, the 3rd Phase of WanLi Industrial Building ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China Tel: +86-755-33320018 Fax: +86-755-33320008 www.baclcorp.com.cn

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *The House of Marley.LLC*'s product, model number: *EM-FH041-MI (FCC ID: PVBEM-EMFH041)* (the "EUT") in this report was a *Liberate XLBT*, which was measured approximately: 20.0 cm (L) x 18.0 cm (W) x 9.0 cm (H), rated with input voltage: DC 3.7V battery.

Note: The product, series model EM-FH041-MI and EM-FH041-SD are electrically identical, the differences beween them are the model number and appearance. Model EM-FH041-MI was selected for fully testing.

** All measurement and test data in this report was gathered from production sample serial number: 1403007 (Assigned by BACL, Shenzhen). The EUT supplied by the applicant was received on 2014-03-27.*

Objective

This report is prepared on behalf of *The House of Marley.LLC* in accordance with Part 2-Subpart J, Part 15-Subparts A, B and C of the Federal Communication Commissions rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, section 15.203, 15.205, 15.207, 15.209 and 15.247 rules.

Related Submittal(s)/Grant(s)

FCC Part 15.247 DTS submissions with FCC ID: *PVBEM-EMFH041*

Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2009, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

All emissions measurement was performed and Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China.

Test site at Bay Area Compliance Laboratories Corp. (Shenzhen) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on December 06, 2010. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2009.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 382179. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in an engineering mode which was selected by manufacturer.

EUT Exercise Software

Install BlueSuite 2_4.exe

Equipment Modifications

No modification was made to the EUT tested.

Support Equipment List and Details

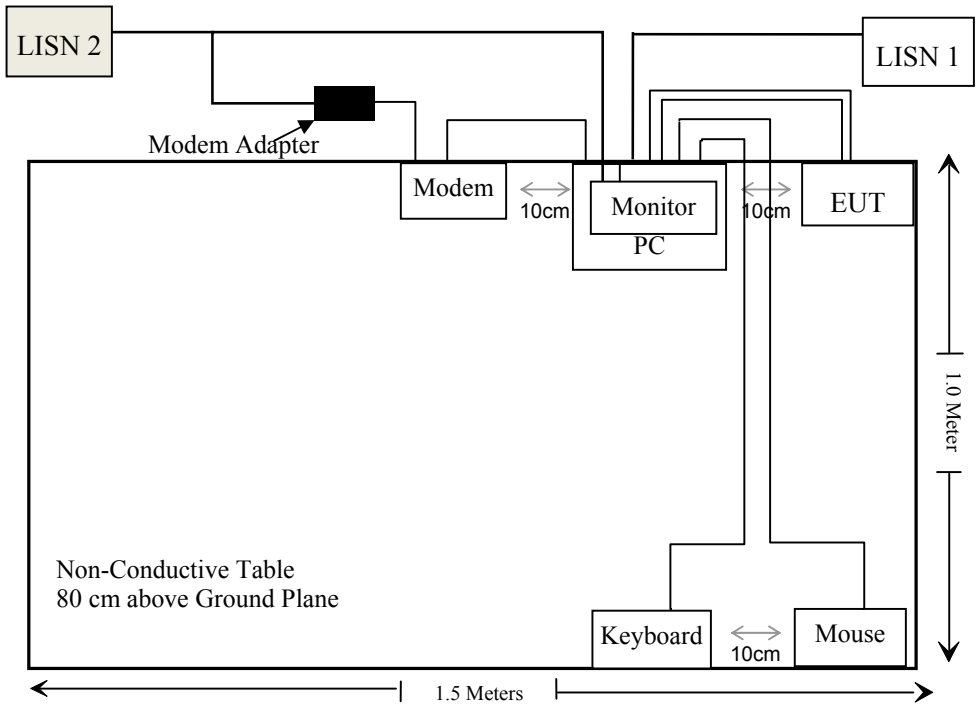
Manufacturer	Description	Model	Serial Number
DELL	PC	VOSTRO 220S	127BP2X
DELL	Monitor	E178WFPC	CN-OWY564-64180-7C4-2SQH
DELL	Keyboard	L100	CNORH656658907BL05DC
DELL	Mouse	MOC5UO	G1900NKD
SAST	Modem	AEM-2100	0293

External I/O Cable

Cable Description	Length (m)	From/Port	To
Shielding Detachable USB Cable	1.5	Host PC	Mouse
Shielding Detachable Serial Cable	1.2	Host PC	Modem
Shielding Detachable K/B Cable	1.5	Host PC	Keyboard
Shielding Detachable VGA Cable	1.5	Host PC	LCD Monitor
Unshielding Detachable USB Cable	1.5	EUT	PC
Unshielding Detachable AV Cable	1.5	EUT	PC

Block Diagram of Test Setup

For Conducted emission test at main port:



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.247 (i), §2.1093	RF EXPOSURE	Compliance
§15.203	Antenna Requirement	Compliance
§15.207 (a)	AC Line Conducted Emissions	Compliance
§15.205, §15.209, §15.247(d)	Radiated Emissions	Compliance
§15.247 (a)(1)	20 dB Emission Bandwidth	Compliance
§15.247(a)(1)	Channel Separation	Compliance
§15.247(a)(1)(iii)	Time of Occupancy (Dwell Time)	Compliance
§15.247(a)(1)(iii)	Quantity of hopping channel	Compliance
§15.247(b)(1)	Peak Output Power Measurement	Compliance
§15.247(d)	Band Edges	Compliance

FCC §15.247 (i) & §2.1093 – RF EXPOSURE

Applicable Standard

According to FCC §2.1093 and §1.1307(b) (1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

According to KDB 447498 D01 General RF Exposure Guidance

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:
[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] · [√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where
1. f(GHz) is the RF channel transmit frequency in GHz.
2. Power and distance are rounded to the nearest mW and mm before calculation.
3. The result is rounded to one decimal place for comparison.
4. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test Exclusion.

The Max Output Power: 4.62dBm=2.90 mW
(2.90/5)* √2.48=0.91<3.0

Result: No need SAR test

FCC §15.203 – ANTENNA REQUIREMENT

Applicable Standard

According to FCC § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

Antenna Connector Construction

The EUT has a PCB antenna arrangement, which was permanently attached and the antenna gain is 0 dBi, fulfill the requirement of this section. Please refer to the internal photos.

Result: Compliance.

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

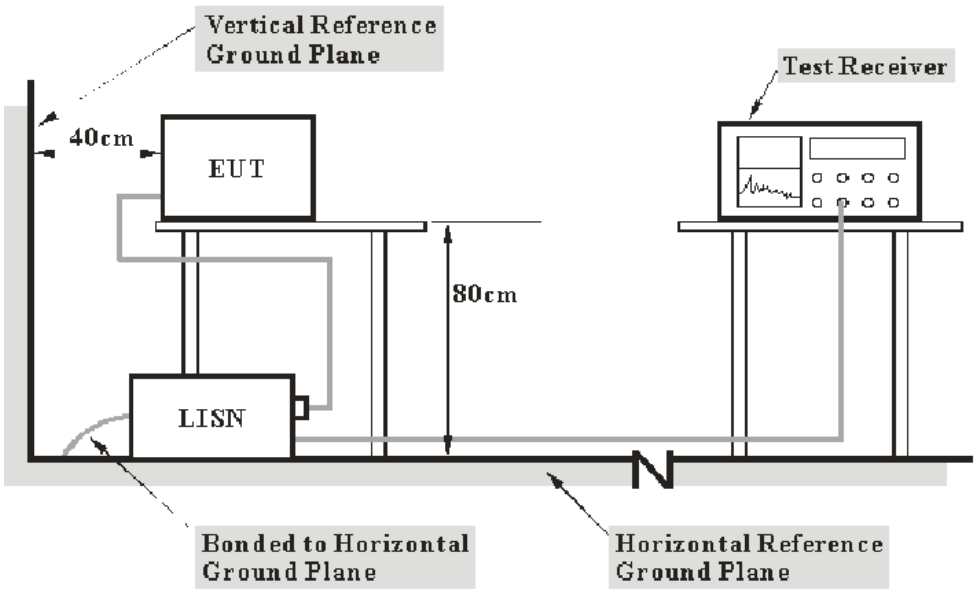
FCC §15.207

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, and LISN.

Based on CISPR-16-4-2, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement at Bay Area Compliance Laboratory Corp. (Shenzhen) is 2.4 dB (k=2, 95% level of confidence), and the uncertainty will not be taken into consideration for the test data recorded in the report.

EUT Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.4-2009 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The adapter was connected to a 120 VAC/60 Hz power source.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Test Procedure

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	101122	2013-09-25	2014-09-25
Rohde & Schwarz	LISN	ENV216	3560.6650.12-101613-Yb	2014-05-07	2015-05-07
Rohde & Schwarz	Transient Limiter	ESH3Z2	DE25985	2013-10-15	2014-10-15
Rohde & Schwarz	CE Test software	EMC 32	V8.53	--	--

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.207, with the worst margin reading of:

5.9 dB at **9.257570 MHz** in the **Neutral** conducted mode

Test Data

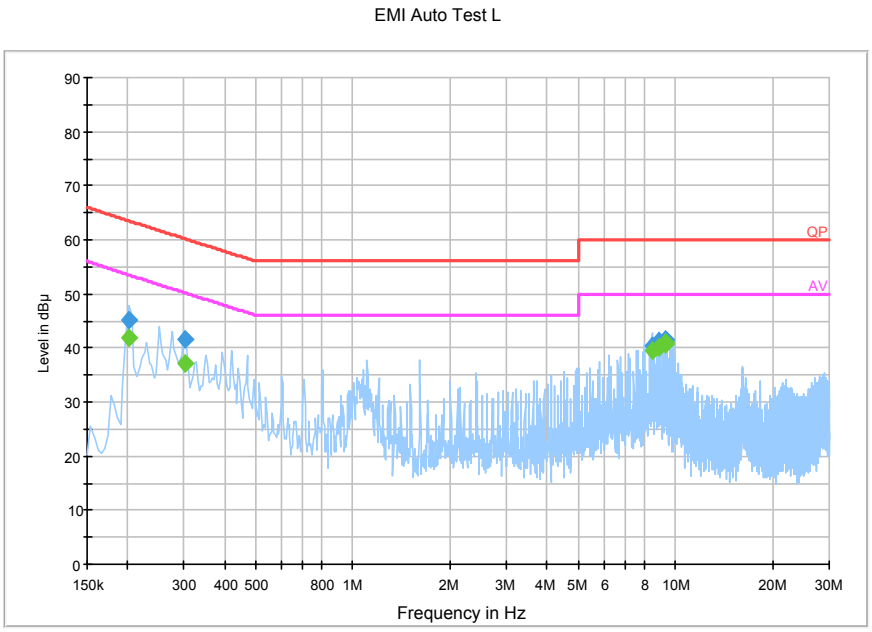
Environmental Conditions

Temperature:	25 ℃
Relative Humidity:	56 %
ATM Pressure:	101.0 kPa

The testing was performed by Mike Hu on 2014-05-06.

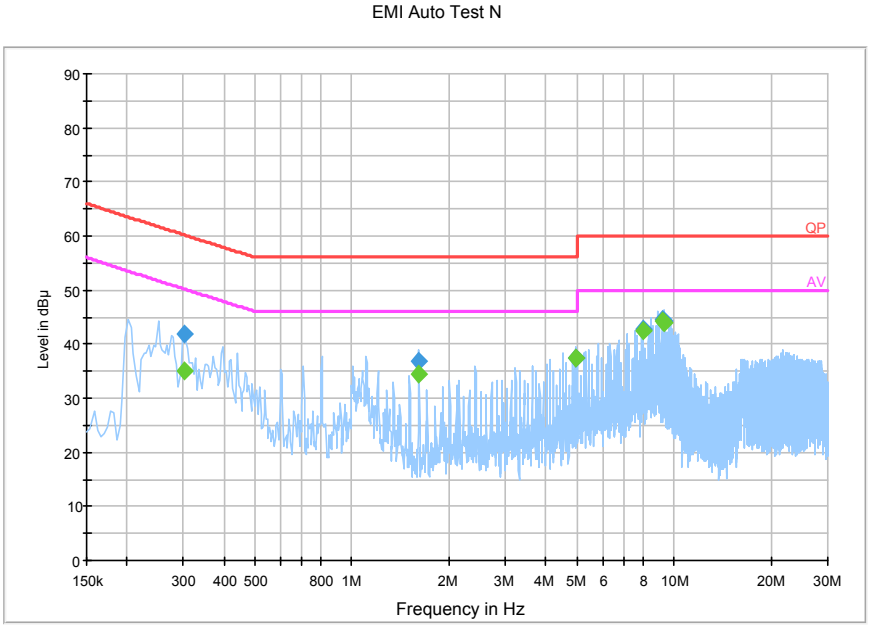
Test Mode: Transmitting & Charging

AC 120V, 60 Hz, Line:



Frequency (MHz)	Corrected Amplitude (dBµV)	Correction Factor (dB)	Limit (dBµV)	Margin (dB)	Detector (PK/QP/Ave.)
0.201500	45.0	19.6	63.5	18.5	QP
0.201500	41.9	19.6	53.5	11.6	Ave.
0.301500	41.6	19.4	60.2	18.6	QP
0.301500	37.1	19.4	50.2	13.1	Ave.
8.451250	40.5	19.7	60.0	19.5	QP
8.451250	39.4	19.7	50.0	10.6	Ave.
8.853250	41.4	19.7	60.0	18.6	QP
8.853250	40.1	19.7	50.0	9.9	Ave.
9.351190	41.2	19.7	60.0	18.8	QP
9.351190	40.6	19.7	50.0	9.4	Ave.
9.353690	41.5	19.7	60.0	18.5	QP
9.353690	41.1	19.7	50.0	8.9	QP

AC 120V, 60 Hz, Neutral:



Frequency (MHz)	Corrected Amplitude (dBµV)	Correction Factor (dB)	Limit (dBµV)	Margin (dB)	Detector (PK/QP/Ave.)
0.301470	41.8	19.5	60.2	18.4	QP
0.301470	35.0	19.5	50.2	15.2	Ave.
1.613790	36.8	19.6	56.0	19.2	QP
1.613790	34.4	19.6	46.0	11.6	Ave.
4.932050	37.4	19.7	56.0	18.6	QP
4.932050	37.3	19.7	46.0	8.7	Ave.
8.049190	42.6	19.8	60.0	17.4	QP
8.049190	42.5	19.8	50.0	7.5	Ave.
9.257570	44.5	19.8	60.0	15.5	QP
9.257570	44.1	19.8	50.0	5.9	Ave.
9.355070	44.2	19.8	60.0	15.8	QP
9.355070	43.9	19.8	50.0	6.1	Ave.

Note:
1) Corrected Amplitude = Reading + Correction Factor
2) Correction Factor = LISN/ISN VDF (Voltage Division Factor) + Cable Loss
3) Margin = Limit – Corrected Amplitude

FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

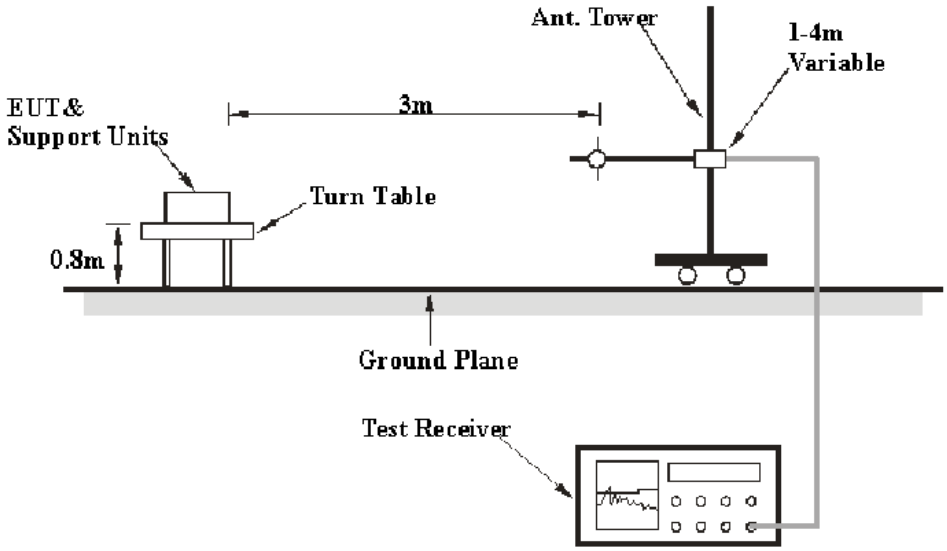
FCC §15.247 (d); §15.209; §15.205;

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on CISPR 16-4-2, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of radiation emissions measurement at Bay Area Compliance Laboratories Corp. (Shenzhen) is 4.0 dB (k=2, 95% level of confidence), and the uncertainty will not be taken into consideration for the test data recorded in the report.

EUT Setup



The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.4-2009. The specification used was the FCC 15.209 and FCC 15.247 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The adapter was connected to a 120 VAC/60 Hz power source.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 25 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Detector
30MHz – 1000 MHz	100 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz	/	Ave.

Test Procedure

For the radiated emissions test, the adapter was connected to the outlet of the LISN.

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz to 1GHz and peak and Average detection modes for frequencies above 1GHz.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Amplifier	8447E	1937A01046	2013-09-30	2014-09-30
Rohde & Schwarz	EMI Test Receiver	ESCI	101122	2013-09-25	2014-09-25
Sunol Sciences	Broadband Antenna	JB1	A040904-2	2011-11-28	2014-11-27
Mini	Pre-amplifier	ZVA-183-S+	5969001149	2014-04-03	2015-04-03
Sunol Sciences	Horn Antenna	DRH-118	A052304	2013-11-30	2014-11-30
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2013-11-12	2014-11-12
DUCOMMUN	Pre-amplifier	ALN-22093530-01	991373-01	2013-08-03	2014-08-03
the electro-Mechanics Co.	Horn Antenna	3116	9510-2270	2013-10-14	2016-10-13

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

Corrected Amplitude = Meter Reading + Antenna Factor + Cable Loss - Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

Margin = Limit – Corrected Amplitude

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.205, 15.209 and 15.247, with the worst margin reading of:

5.02 dB at **4882.0 MHz** in the **Vertical** polarization

Test Data

Environmental Conditions

Temperature:	26 ℃
Relative Humidity:	52 %
ATM Pressure:	101.0 kPa

The testing was performed by Mike Hu on 2014-04-14.

Test Mode: Transmitting & Charging

30 MHz -25 GHz: (*Scan with GFSK, π/4-DQPSK, 8-DPSK, the worst case is BDR Mode (GFSK)*)

Frequency (MHz)	Receiver		Turn table Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
Low Channel (2402 MHz)									
152.3	44.23	QP	209	1.4	V	-14.9	30.33	43.5	13.17
2402.0	94.64	PK	150	1.4	H	5.48	100.12	/	/
2402.0	86.56	Ave.	150	1.4	H	5.48	92.04	/	/
2402.0	92.32	PK	302	1.3	V	5.48	97.80	/	/
2402.0	84.83	Ave.	302	1.3	V	5.48	90.31	/	/
2356.2	34.89	PK	67	1.4	H	5.48	40.37	74	33.63
2356.2	23.54	Ave.	67	1.4	H	5.48	29.02	54	24.98
2388.5	46.52	PK	101	1.3	V	5.48	52.00	74	22.00
2388.5	28.35	Ave.	101	1.3	V	5.48	33.83	54	20.17
2492.7	34.32	PK	177	1.3	H	7.21	41.53	74	32.47
2492.7	23.22	Ave.	177	1.3	H	7.21	30.43	54	23.57
4804.0	40.68	PK	157	1.4	H	12.44	53.12	74	20.88
4804.0	35.53	Ave.	157	1.4	H	12.44	47.97	54	6.03
7206.0	34.52	PK	236	1.4	V	17.06	51.58	74	22.42
7206.0	23.27	Ave.	236	1.4	V	17.06	40.33	54	13.67
9608.0	34.88	PK	254	1.4	H	19.28	54.16	74	19.84
9608.0	22.84	Ave.	254	1.4	H	19.28	42.12	54	11.88
Middle Channel (2441 MHz)									
152.3	45.07	QP	243	1.3	V	-14.9	30.17	43.5	13.37
2441.0	93.47	PK	261	1.2	H	6.13	99.60	/	/
2441.0	86.43	Ave.	261	1.2	H	6.13	92.56	/	/
2441.0	91.24	PK	53	1.5	V	6.13	97.37	/	/
2441.0	84.01	Ave.	53	1.5	V	6.13	90.14	/	/
2361.8	34.59	PK	108	1.3	V	5.48	40.07	74	33.93
2361.8	22.76	Ave.	108	1.3	V	5.48	28.24	54	25.76
2488.9	34.34	PK	203	1.3	H	7.21	41.55	74	32.45
2488.9	22.72	Ave.	203	1.3	H	7.21	29.93	54	24.07
2489.4	35.57	PK	204	1.4	H	7.21	42.78	74	31.22
2489.4	23.12	Ave.	204	1.4	H	7.21	30.33	54	23.67
4882.0	41.35	PK	169	1.3	V	12.4	53.75	74	20.25
4882.0	36.58	Ave.	169	1.3	V	12.4	48.98	54	5.02
7323.0	35.48	PK	148	1.3	V	16.49	51.97	74	22.03
7323.0	23.21	Ave.	148	1.3	V	16.49	39.70	54	14.30
9764.0	34.32	PK	261	1.4	H	19.4	53.72	74	20.28
9764.0	22.59	Ave.	261	1.4	H	19.4	41.99	54	12.01

Frequency (MHz)	Receiver		Turn table Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.247/205/209	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
High Channel (2480 MHz)									
152.3	44.37	QP	80	1.2	V	-14.9	29.47	43.5	14.03
2480.0	92.35	PK	155	1.3	H	7.21	99.56	/	/
2480.0	84.93	Ave.	155	1.3	H	7.21	92.14	/	/
2480.0	89.90	PK	279	1.3	V	7.21	97.11	/	/
2480.0	81.33	Ave.	279	1.3	V	7.21	88.54	/	/
2378.5	35.43	PK	125	1.3	H	5.48	40.91	74	33.09
2378.5	23.04	Ave.	125	1.3	H	5.48	28.52	54	25.48
2483.6	40.27	PK	308	1.3	V	7.21	47.48	74	26.52
2483.6	29.54	Ave.	308	1.3	V	7.21	36.75	54	17.25
2492.5	39.52	PK	116	1.4	V	7.21	46.73	74	27.27
2492.5	28.67	Ave.	116	1.4	V	7.21	35.88	54	18.12
4960.0	41.41	PK	225	1.2	H	12.5	53.91	74	20.09
4960.0	35.83	Ave.	225	1.2	H	12.5	48.33	54	5.67
7440.0	34.49	PK	323	1.4	H	15.9	50.39	74	23.61
7440.0	22.84	Ave.	323	1.4	H	15.9	38.74	54	15.26
9920.0	35.44	PK	66	1.3	V	19.39	54.83	74	19.17
9920.0	22.27	Ave.	66	1.3	V	19.39	41.66	54	12.34

Note:

Corrected Amplitude = Corrected Factor + Reading
Corrected Factor=Antenna factor (RX) + cable loss – amplifier factor
Margin = Limit- Corr. Amplitude

FCC §15.247(a) (1)-CHANNEL SEPARATION

Applicable Standard

Frequency hopping systems shall have hoping channel carrier frequencies separated by a minimum of 25 kHz or the 20dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater provided the systems operate with an output power no greater than 125 mW.

Test Procedure

1. Set the EUT in operating mode, RBW was set at 100 kHz,VBW≥ 3RBW maxhold the channel.
2. Set the adjacent channel of the EUT maxhold another trace
3. Measure the channel separation.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	101122	2013-09-25	2014-09-25

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	25 ℃
Relative Humidity:	53~54 %
ATM Pressure:	101.0 kPa

The testing was performed by Mike Hu on 2014-04-11 and 2014-04-13.

Test Result: Compliance.

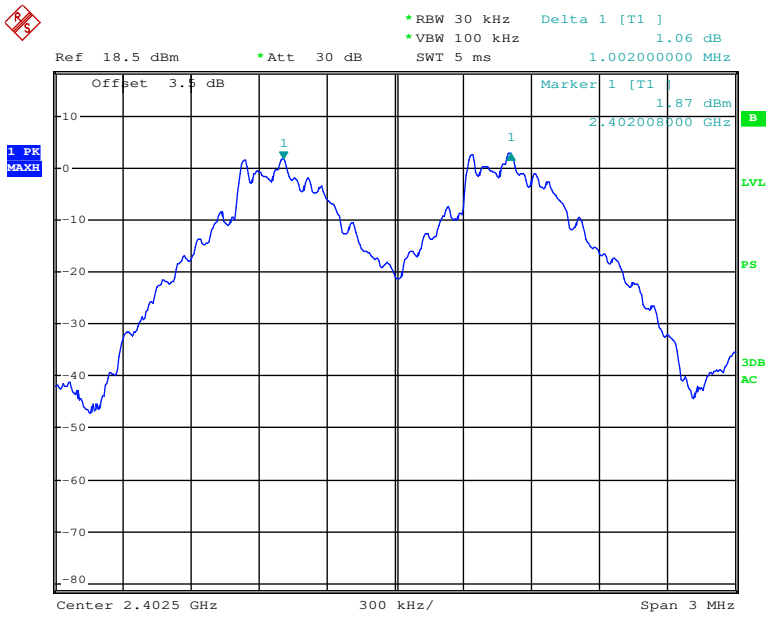
Please refer to following tables and plots

Test Mode: Transmitting

Mode	Channel	Frequency (MHz)	Channel Separation (MHz)	≥Limit (MHz)	Result
BDR (GFSK)	Low	2402	1.002	0.608	Pass
	Adjacent	2403			
	Middle	2441	1.002	0.608	Pass
	Adjacent	2442			
	High	2480	1.002	0.608	Pass
	Adjacent	2479			
EDR (π/4-DQPSK)	Low	2402	1.002	0.816	Pass
	Adjacent	2403			
	Middle	2441	1.002	0.812	Pass
	Adjacent	2442			
	High	2480	1.002	0.816	Pass
	Adjacent	2479			
EDR (8DPSK)	Low	2402	1.002	0.799	Pass
	Adjacent	2403			
	Middle	2441	1.002	0.808	Pass
	Adjacent	2442			
	High	2480	1.002	0.812	Pass
	Adjacent	2479			

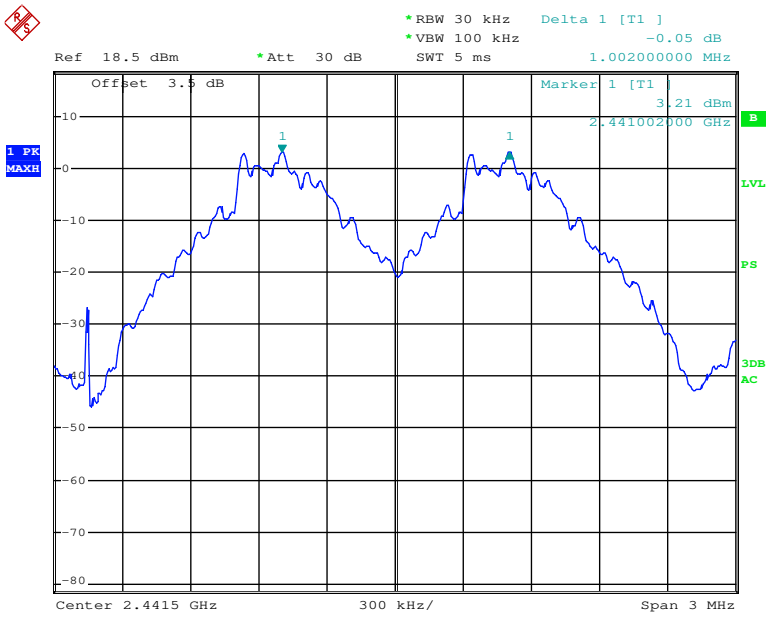
Note: Limit = 20 dB bandwidth *2/3

BDR (GFSK): Low Channel



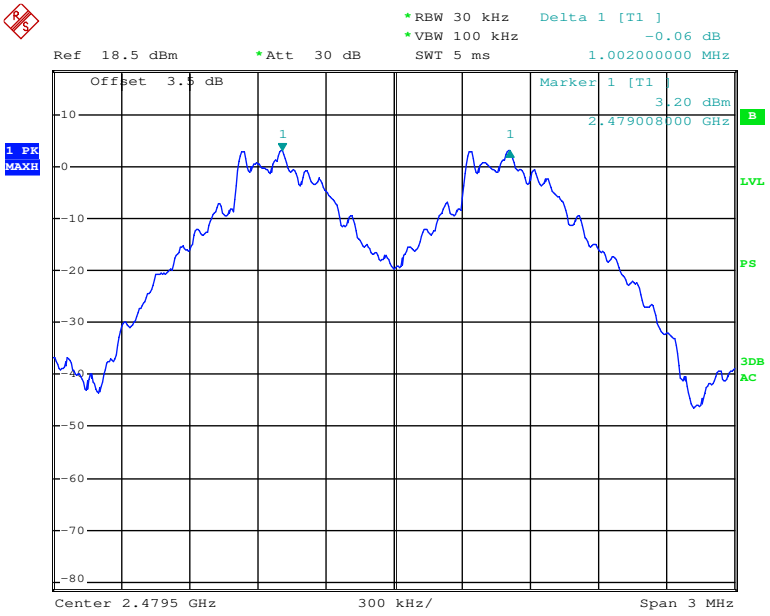
Date: 11.APR.2014 23:52:26

BDR (GFSK): Middle Channel



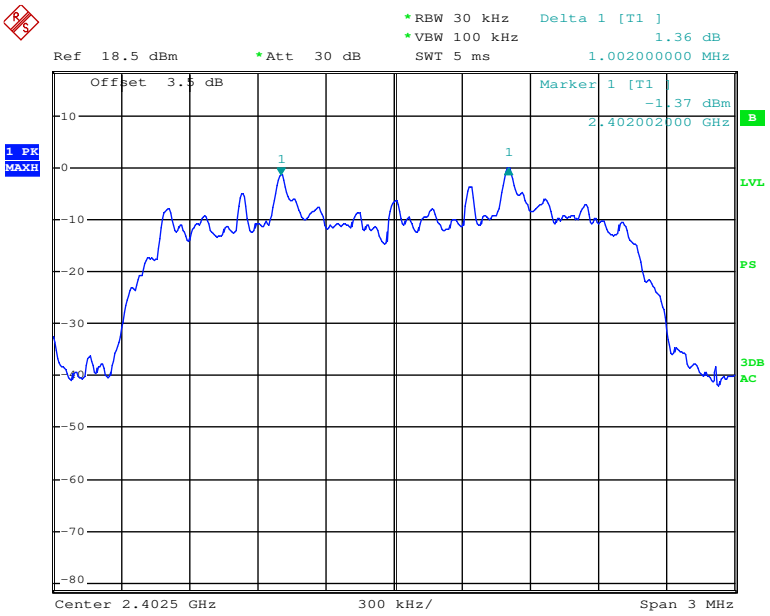
Date: 11.APR.2014 23:58:13

BDR (GFSK): High Channel



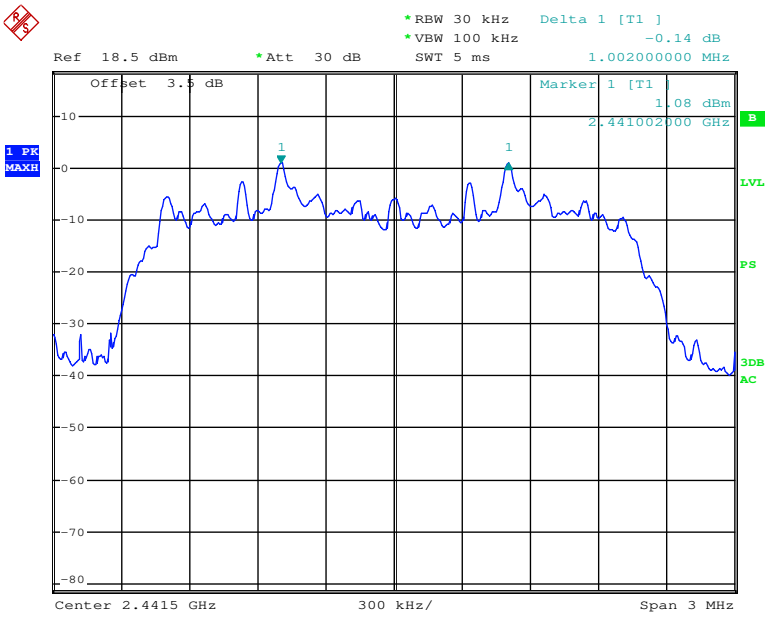
Date: 13.APR.2014 18:22:18

EDR (π/4-DQPSK): Low Channel



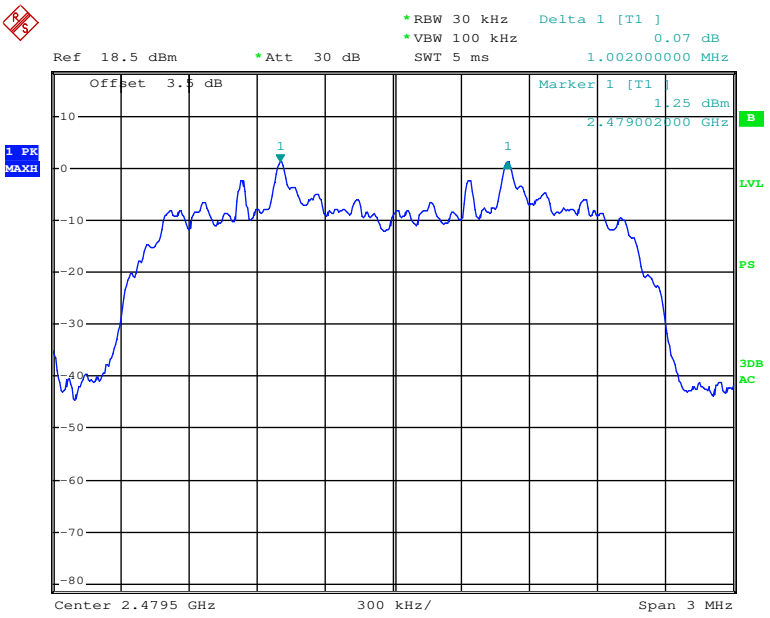
Date: 13.APR.2014 17:01:20

EDR (π/4-DQPSK): Middle Channel



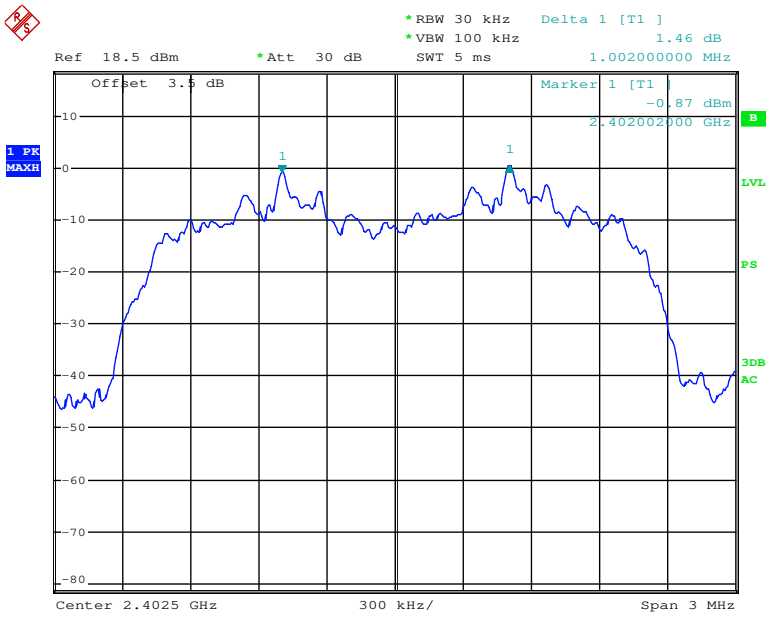
Date: 13.APR.2014 16:50:42

EDR (π/4-DQPSK): High Channel



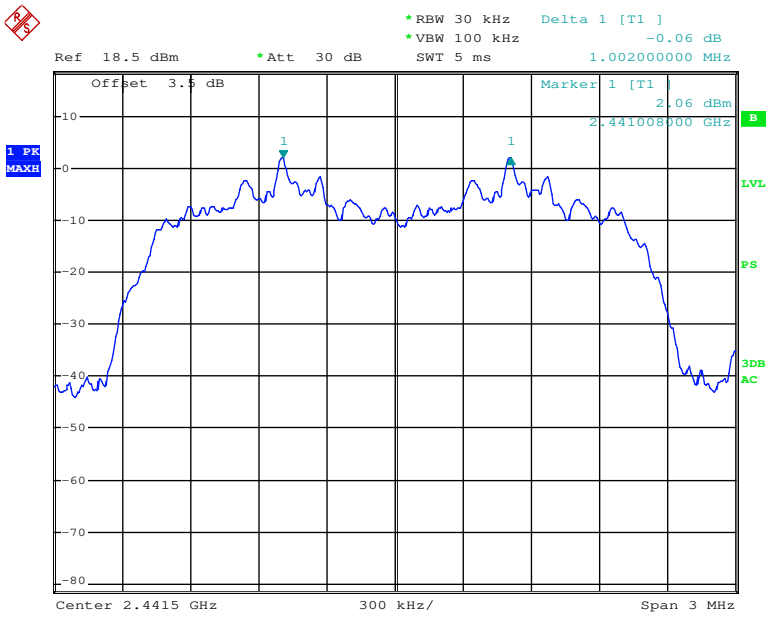
Date: 13.APR.2014 18:10:52

EDR (8DPSK): Low Channel



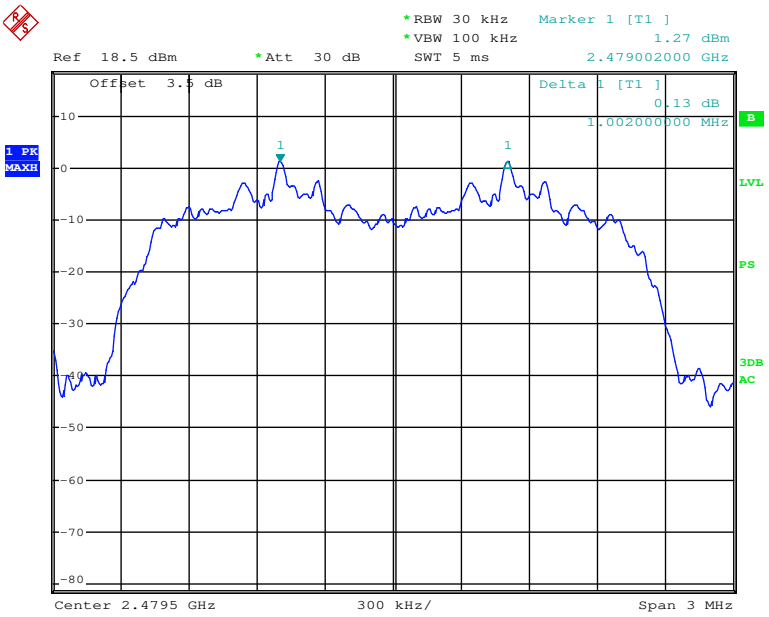
Date: 13.APR.2014 17:46:32

EDR (8DPSK): Middle Channel



Date: 13.APR.2014 17:44:46

EDR (8DPSK): High Channel



Date: 13.APR.2014 17:36:16

FCC §15.247(a) (1) – 20 dB EMISSION BANDWIDTH

Applicable Standard

Alternatively, frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125mW.

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
3. Repeat above procedures until all frequencies measured were complete.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	101122	2013-09-25	2014-09-25

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	25 ℃
Relative Humidity:	53~54 %
ATM Pressure:	101.0 kPa

The testing was performed by Mike Hu on 2014-04-11 and 2014-04-13.

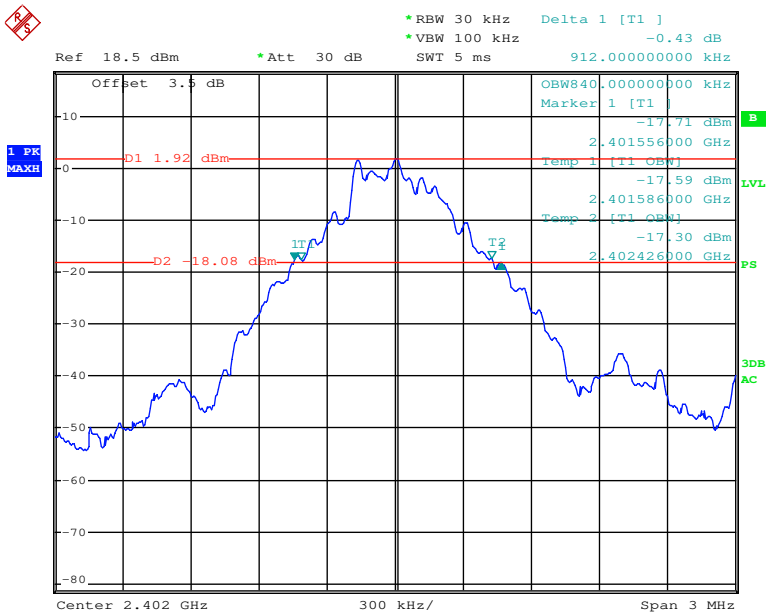
Test Result: Compliance.

Please refer to following tables and plots

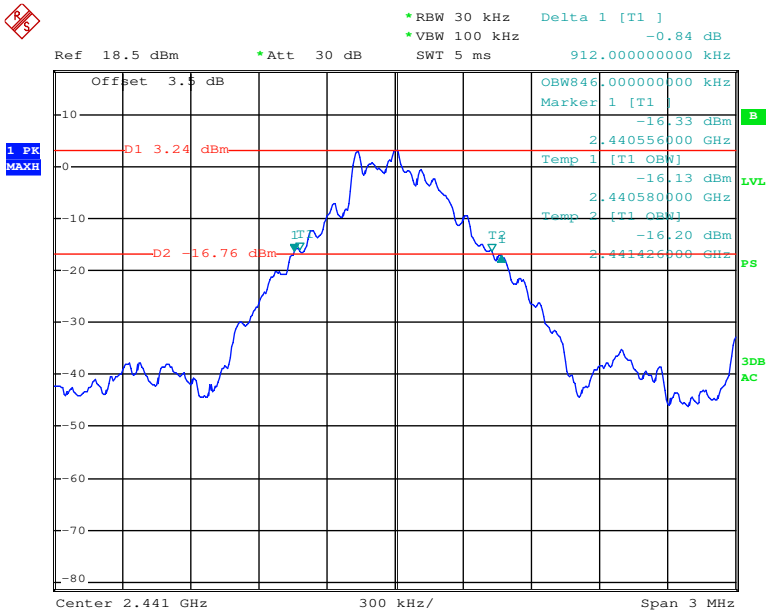
Test Mode: Transmitting

Mode	Channel	Frequency (MHz)	20 dB Emission Bandwidth (MHz)
BDR (GFSK)	Low	2402	0.912
	Middle	2441	0.912
	High	2480	0.912
EDR (π/4-DQPSK)	Low	2402	1.224
	Middle	2441	1.218
	High	2480	1.224
EDR (8DPSK)	Low	2402	1.198
	Middle	2441	1.212
	High	2480	1.218

BDR (GFSK): Low Channel

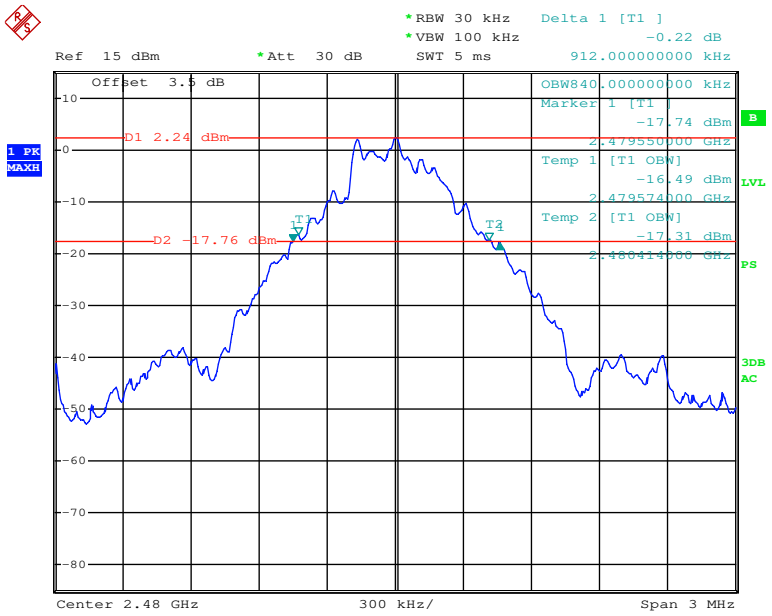


BDR (GFSK): Middle Channel



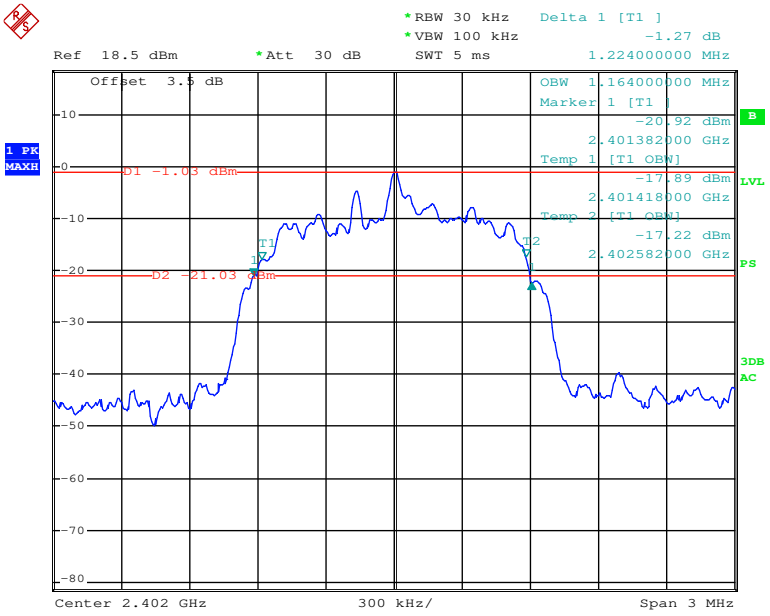
Date: 11.APR.2014 23:55:02

BDR (GFSK): High Channel



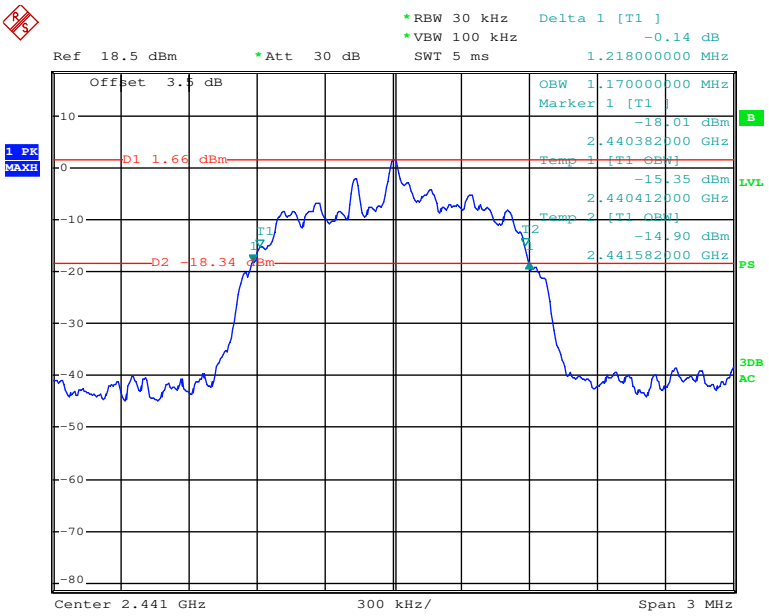
Date: 13.APR.2014 16:29:31

EDR (π/4-DQPSK): Low Channel



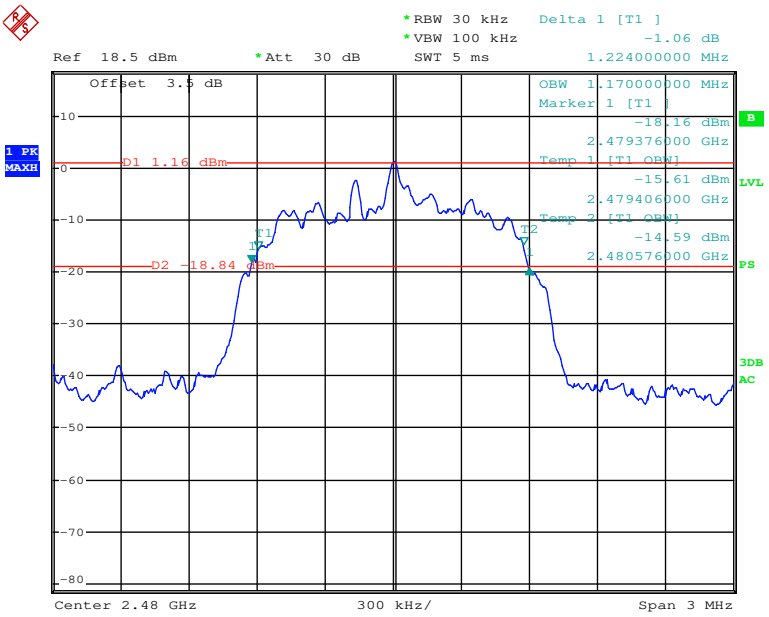
Date: 13.APR.2014 18:07:07

EDR (π/4-DQPSK): Middle Channel



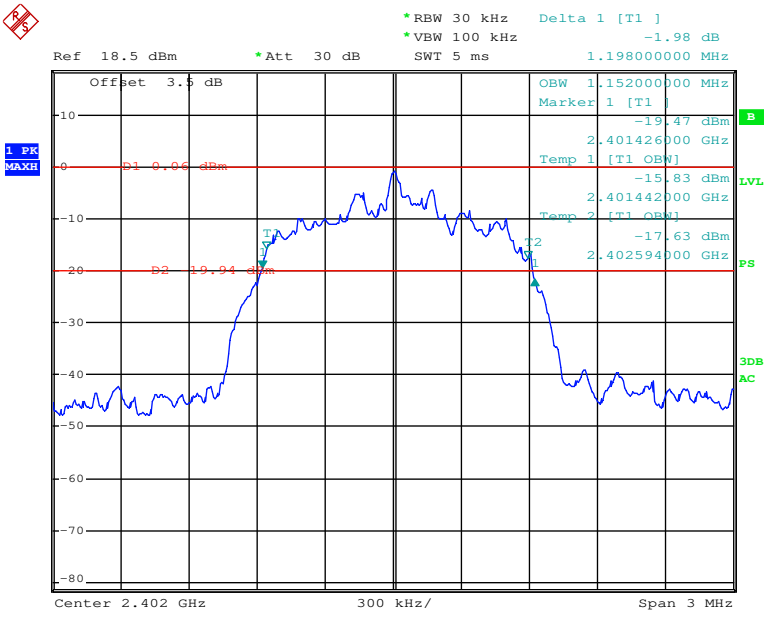
Date: 13.APR.2014 18:08:36

EDR (π/4-DQPSK): High Channel



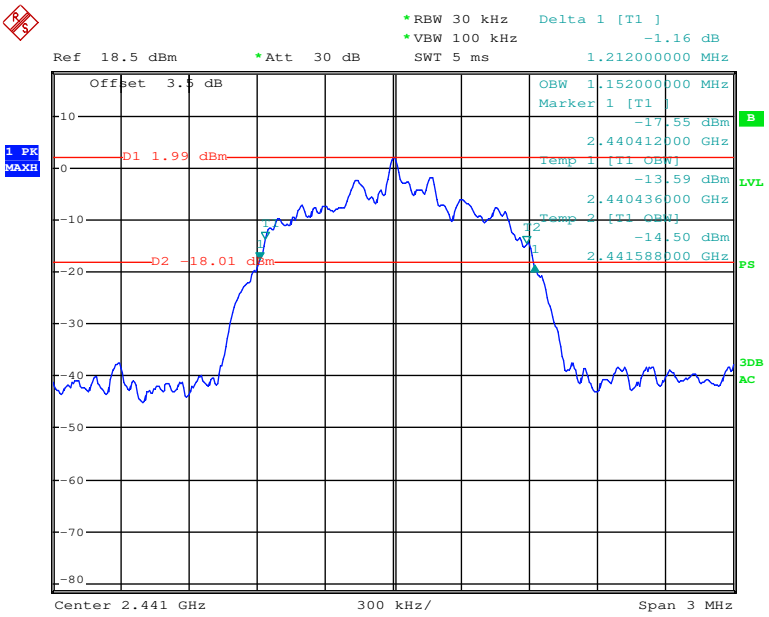
Date: 13.APR.2014 18:02:54

EDR (8DPSK): Low Channel



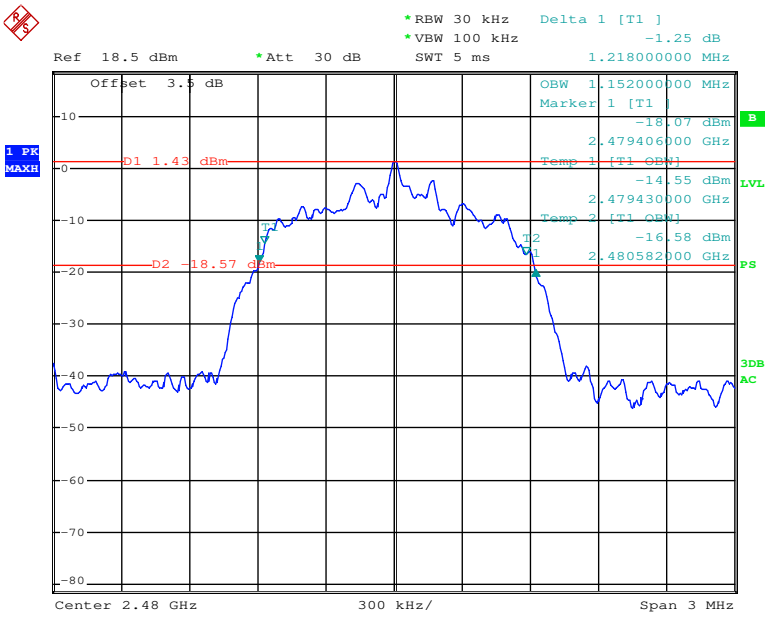
Date: 13.APR.2014 17:48:07

EDR (8DPSK): Middle Channel



Date: 13.APR.2014 17:43:11

EDR (8DPSK): High Channel



Date: 13.APR.2014 17:34:45

FCC §15.247(a) (1) (iii)-QUANTITY OF HOPPING CHANNEL

Applicable Standard

Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

Test Procedure

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.

2. Set the EUT in hopping mode from first channel to last.

3. By using the max-hold function record the quantity of the channel.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	101122	2013-09-25	2014-09-25

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	26 ℃
Relative Humidity:	52 %
ATM Pressure:	101.0 kPa

The testing was performed by Mike Hu on 2014-04-14.

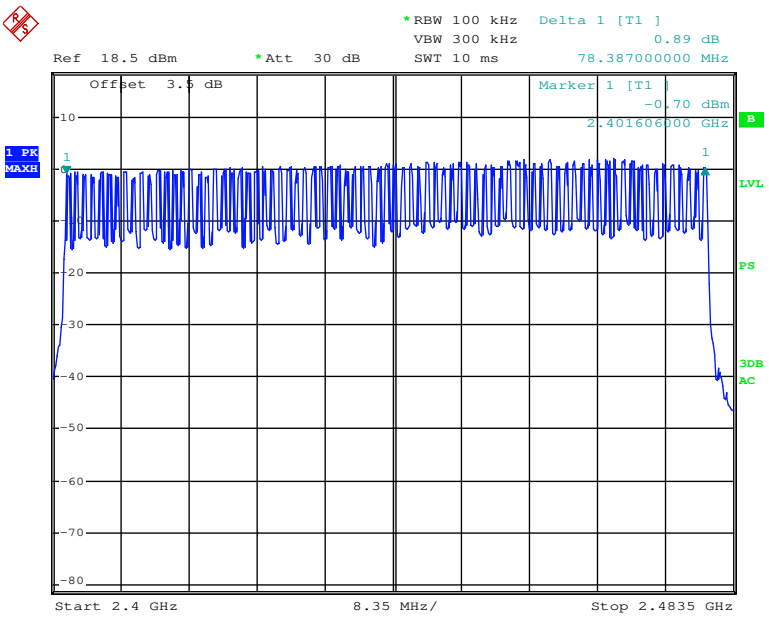
Test Result: Compliance.

Please refer to following tables and plots

Test Mode: Transmitting

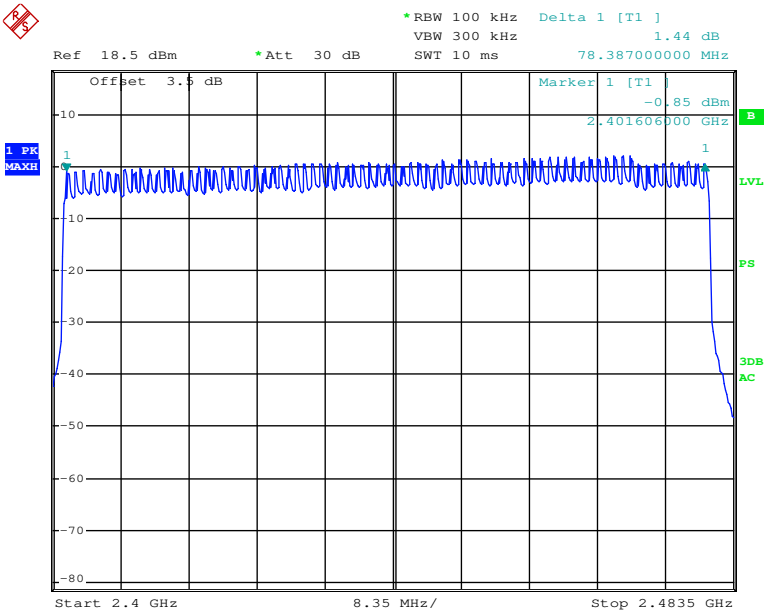
Frequency Range (MHz)	Number of Hopping Channel	Limit
2400-2483.50	79	≥ 15

BDR (GFSK): Number of Hopping Channels



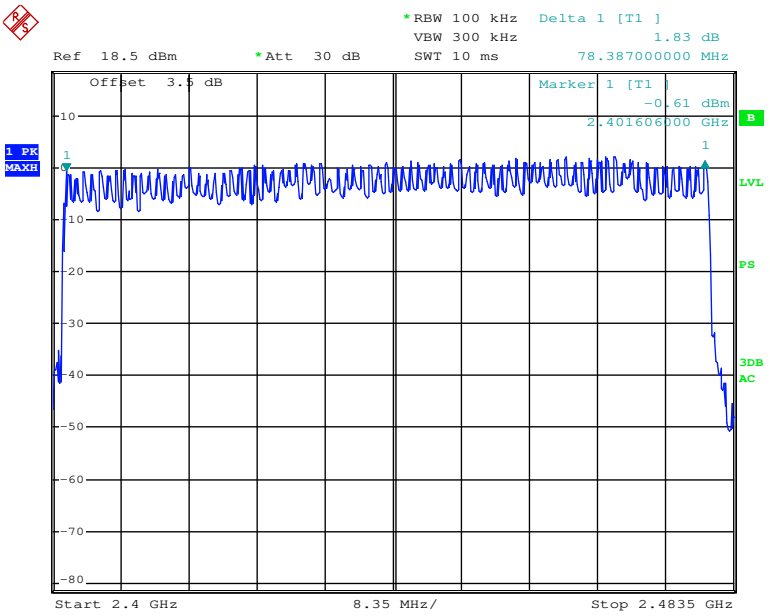
Date: 14.APR.2014 18:04:45

EDR (π/4-DQPSK): Number of Hopping Channels



Date: 14.APR.2014 18:46:25

EDR (8DPSK): Number of Hopping Channels



Date: 14.APR.2014 18:54:35

FCC §15.247(a) (1) (iii) - TIME OF OCCUPANCY (DWELL TIME)

Applicable Standard

Frequency hopping systems in the 2400-2483.5 MHz shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

Test Procedure

The EUT was worked in channel hopping; spectrum span was set as 0. Sweep was set as 0.4 X channel no. (s), the quantity of pulse was get from single sweep. In addition, the time of single pulses was tested.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	101122	2013-09-25	2014-09-25

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	26 ℃
Relative Humidity:	52 %
ATM Pressure:	101.0 kPa

The testing was performed by Mike Hu on 2014-04-14.

Test Result: Compliance.

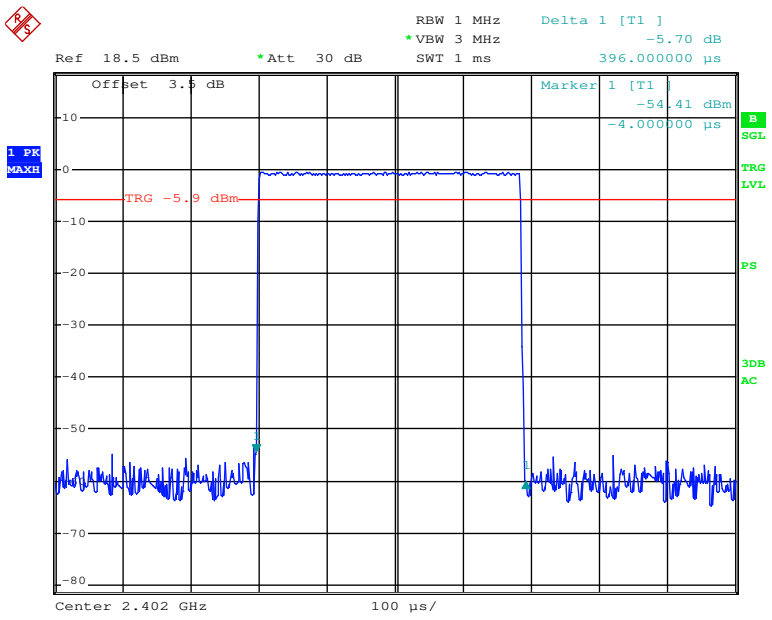
Please refer to following tables and plots

Test Mode: Transmitting

Mode		Channel	Pulse Width (ms)	Dwell Time (S)	Limit (S)	Result
BDR (GFSK)	DH 1	Low	0.396	0.127	0.4	Pass
		Middle	0.396	0.127	0.4	Pass
		High	0.396	0.127	0.4	Pass
		Note: DH1:Dwell time = Pulse time*(1600/2/79)*31.6S				
	DH 3	Low	1.668	0.267	0.4	Pass
		Middle	1.668	0.267	0.4	Pass
		High	1.668	0.267	0.4	Pass
		Note: DH3:Dwell time = Pulse time*(1600/4/79)*31.6S				
	DH 5	Low	2.928	0.312	0.4	Pass
		Middle	2.928	0.312	0.4	Pass
		High	2.928	0.312	0.4	Pass
		Note: DH5:Dwell time = Pulse time*(1600/6/79)*31.6S				
EDR (π/4-DQPSK)	DH 1	Low	0.396	0.127	0.4	Pass
		Middle	0.396	0.127	0.4	Pass
		High	0.396	0.127	0.4	Pass
		Note: 2DH1:Dwell time = Pulse time*(1600/2/79)*31.6S				
	DH 3	Low	1.660	0.266	0.4	Pass
		Middle	1.660	0.266	0.4	Pass
		High	1.660	0.266	0.4	Pass
		Note: 2DH3:Dwell time = Pulse time*(1600/4/79)*31.6S				
	DH 5	Low	2.928	0.312	0.4	Pass
		Middle	2.928	0.312	0.4	Pass
		High	2.928	0.312	0.4	Pass
		Note: 2DH5:Dwell time = Pulse time*(1600/6/79)*31.6S				
EDR (8DPSK)	DH 1	Low	0.396	0.127	0.4	Pass
		Middle	0.396	0.127	0.4	Pass
		High	0.396	0.127	0.4	Pass
		Note: 3DH1:Dwell time = Pulse time*(1600/2/79)*31.6S				
	DH 3	Low	1.660	0.266	0.4	Pass
		Middle	1.660	0.266	0.4	Pass
		High	1.660	0.266	0.4	Pass
		Note: 3DH3:Dwell time = Pulse time*(1600/4/79)*31.6S				
	DH 5	Low	2.928	0.312	0.4	Pass
		Middle	2.928	0.312	0.4	Pass
		High	2.928	0.312	0.4	Pass
		Note: 3DH5:Dwell time = Pulse time*(1600/6/79)*31.6S				

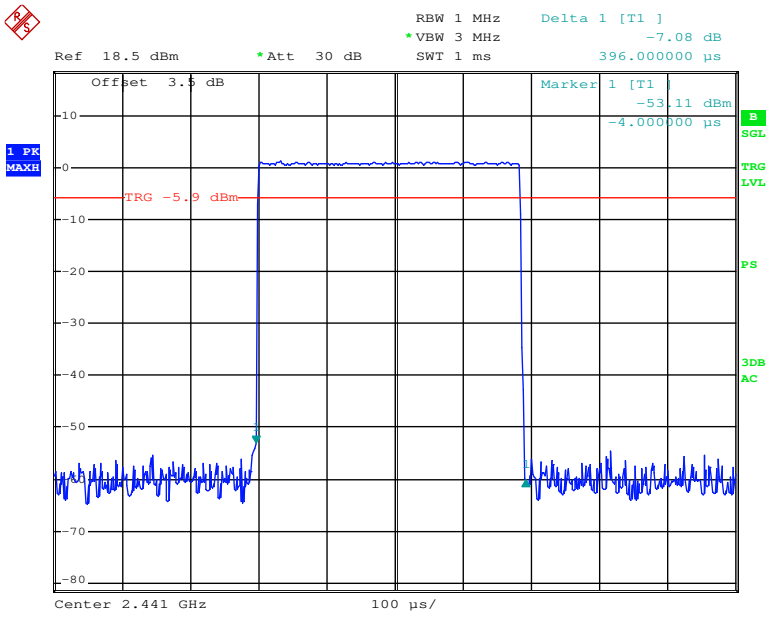
BDR (GFSK):

Pulse time, Low Channel, DH1



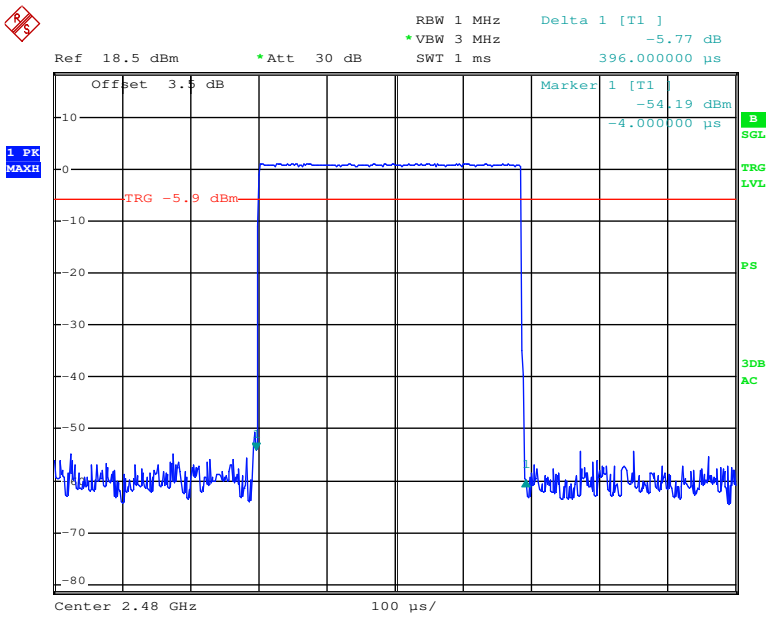
Date: 14.APR.2014 18:57:30

Pulse time, Middle Channel, DH1



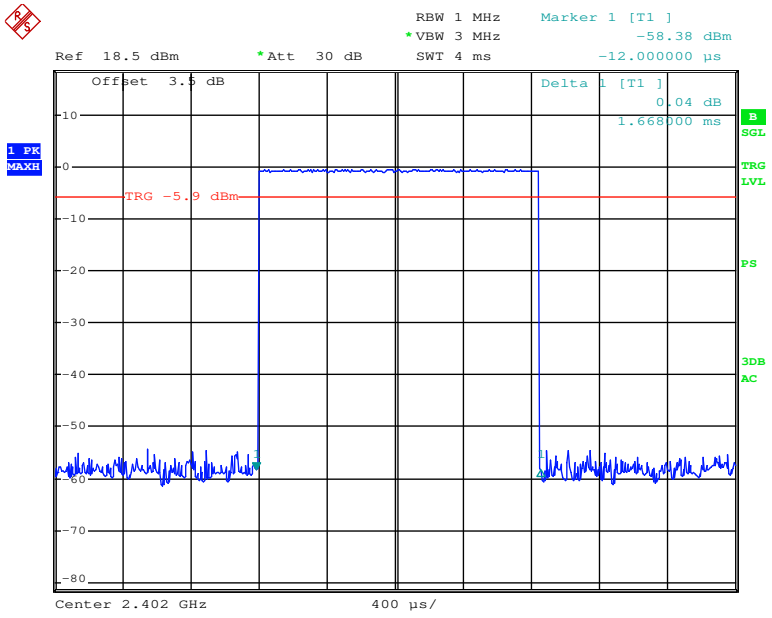
Date: 14.APR.2014 18:58:19

Pulse time, High Channel, DH1



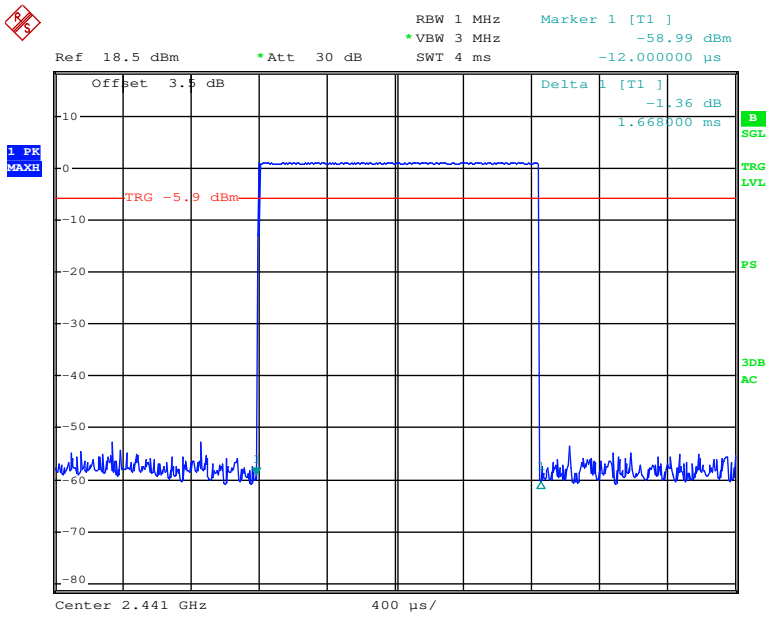
Date: 14.APR.2014 18:58:51

Pulse time, Low Channel, DH3



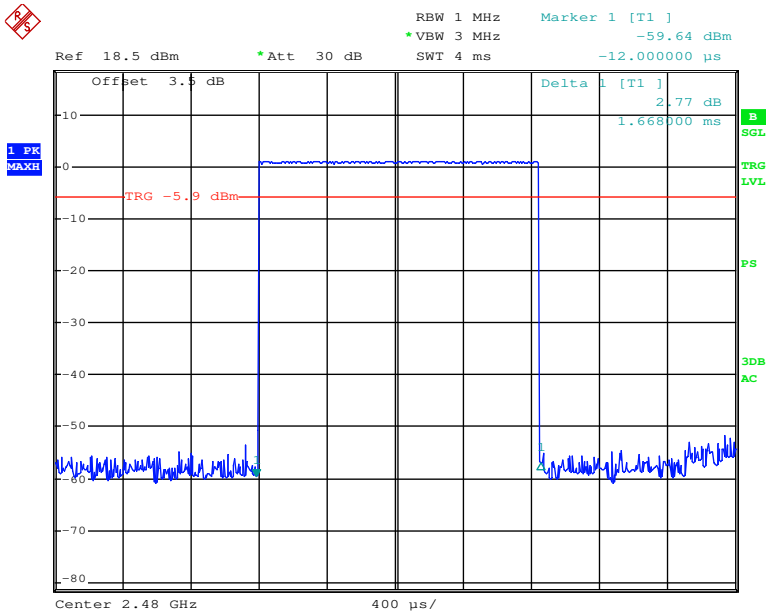
Date: 14.APR.2014 19:10:16

Pulse time, Middle Channel, DH3



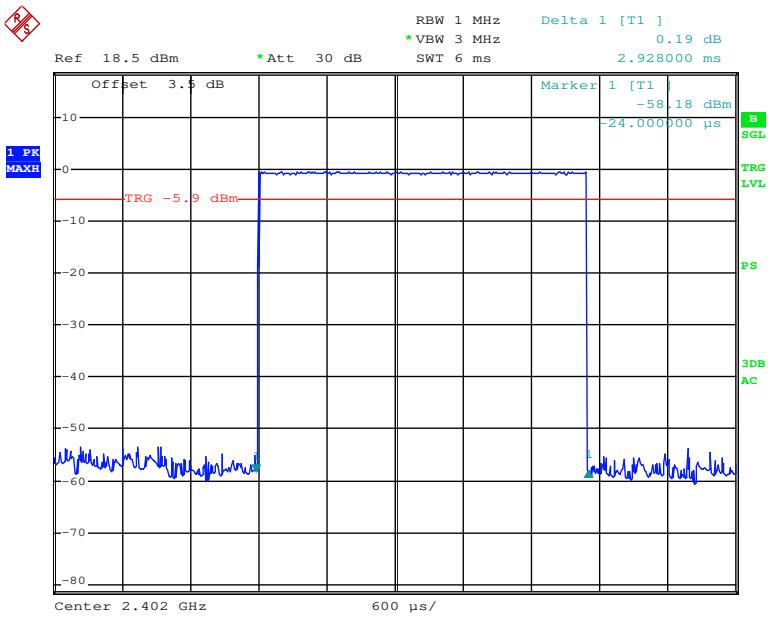
Date: 14.APR.2014 19:09:13

Pulse time, High Channel, DH3



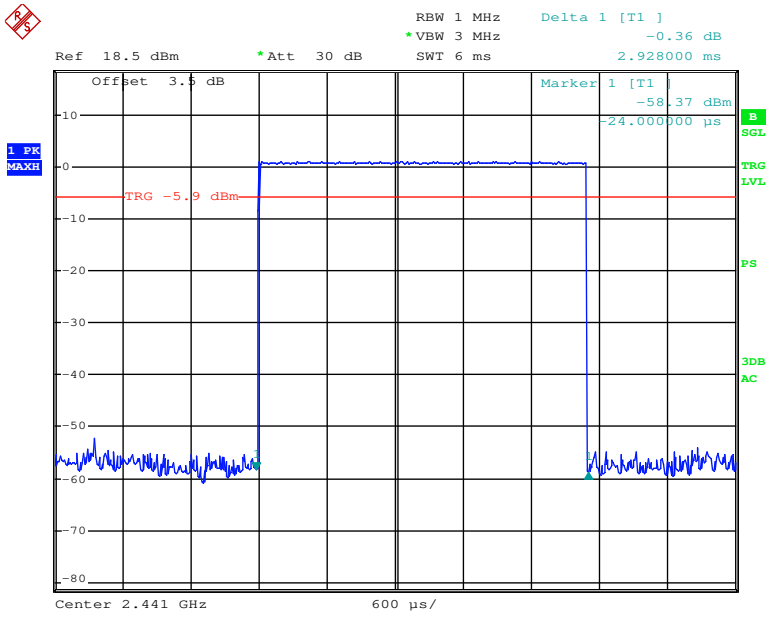
Date: 14.APR.2014 19:08:35

Pulse time, Low Channel, DH5



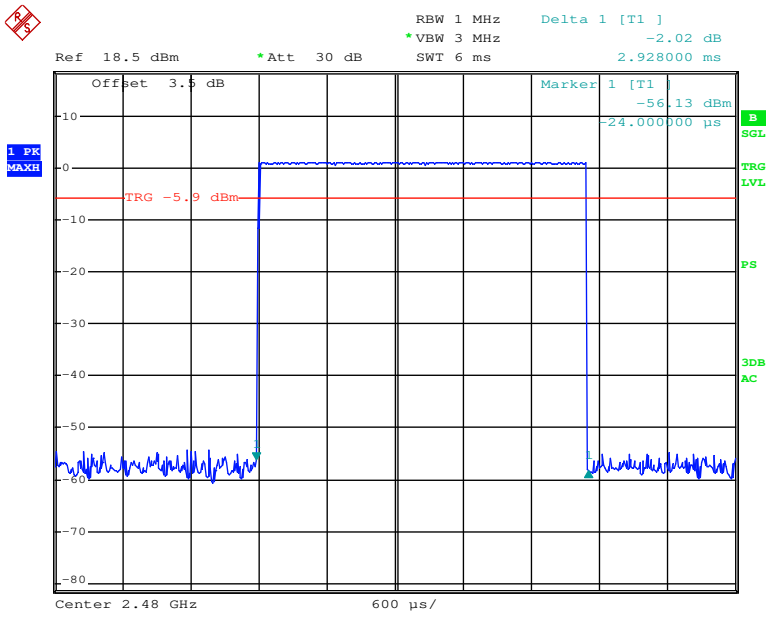
Date: 14.APR.2014 19:15:37

Pulse time, Middle Channel, DH5



Date: 14.APR.2014 19:17:12

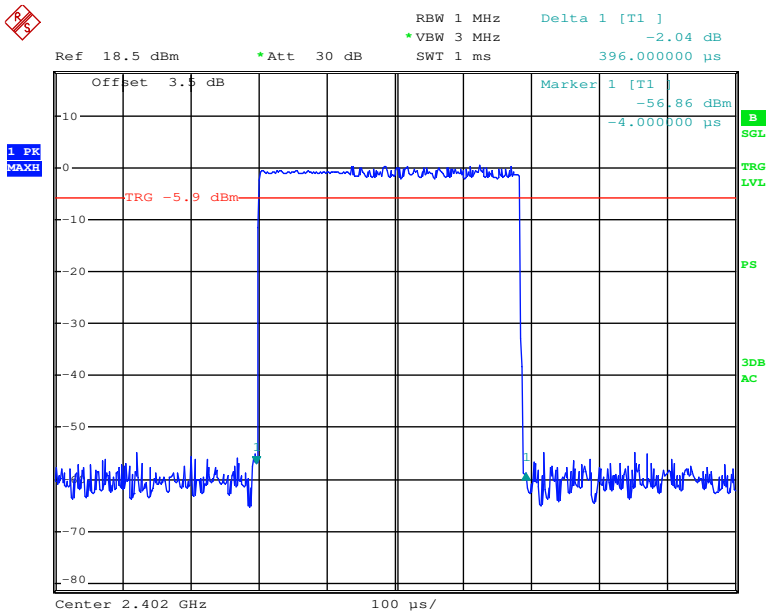
Pulse time, High Channel, DH5



Date: 14.APR.2014 19:18:38

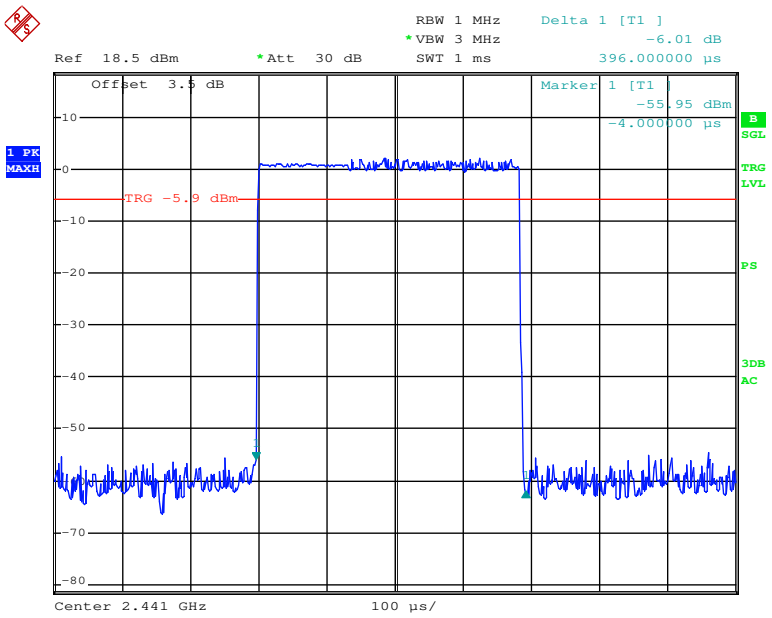
EDR (π/4-DQPSK):

Pulse time, Low Channel, 2DH1



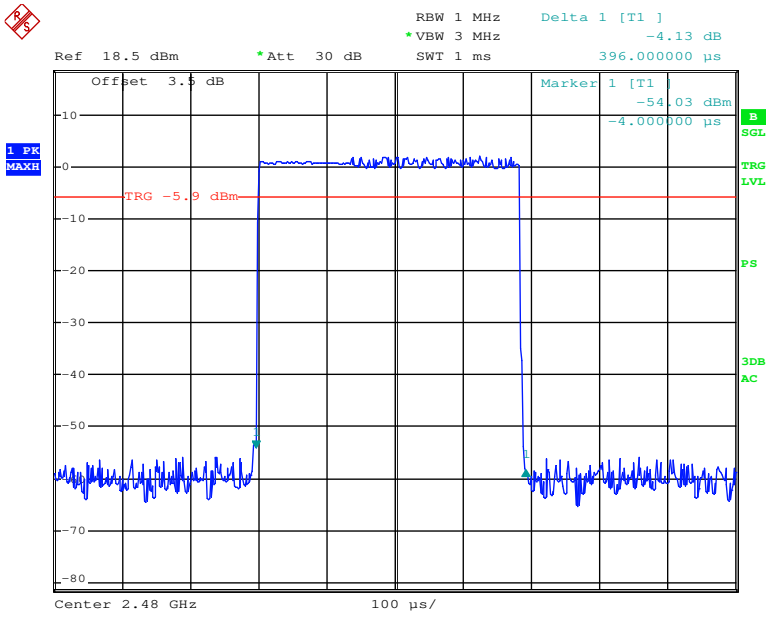
Date: 14.APR.2014 19:00:25

Pulse time, Middle Channel, 2DH1



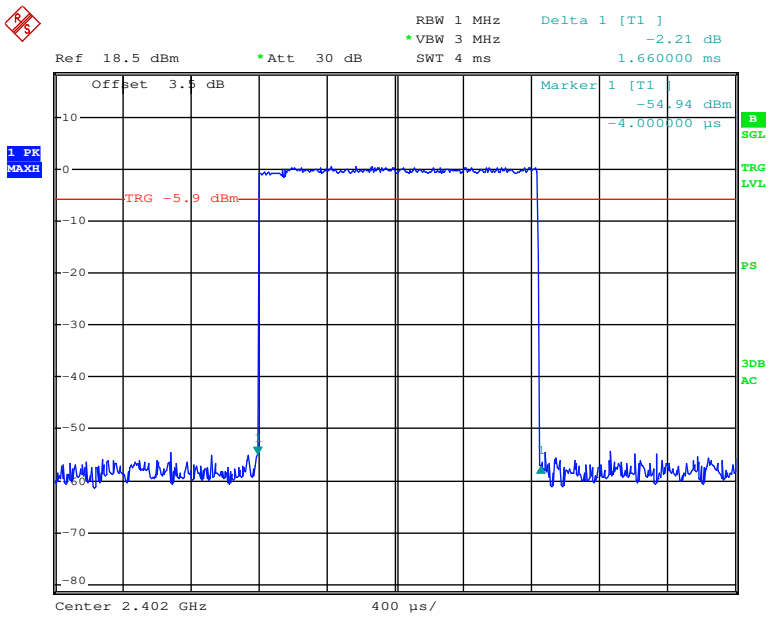
Date: 14.APR.2014 18:59:58

Pulse time, High Channel, 2DH1



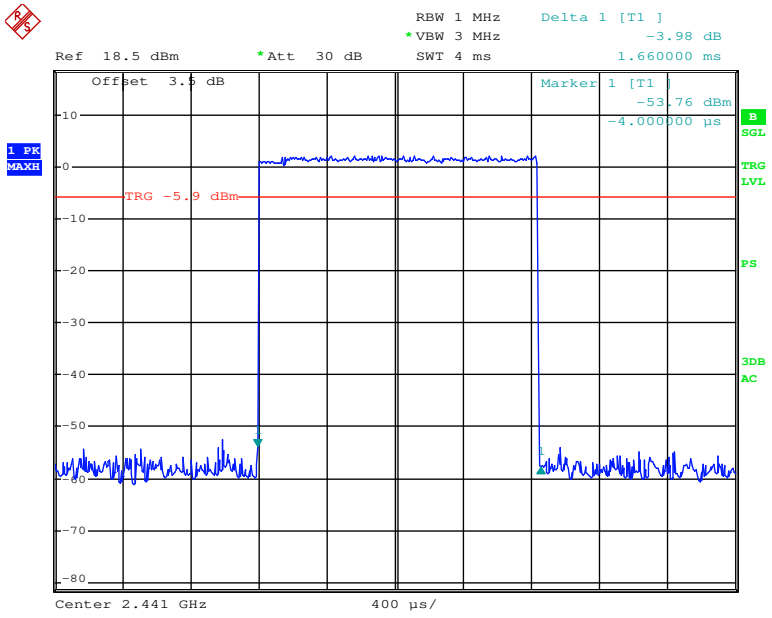
Date: 14.APR.2014 18:59:23

Pulse time, Low Channel, 2DH3



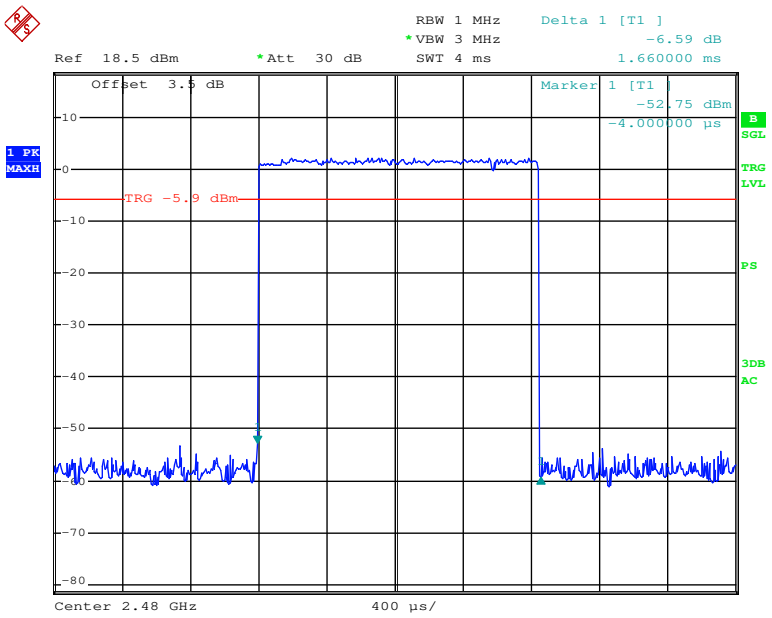
Date: 14.APR.2014 19:06:28

Pulse time, Middle Channel, 2DH3



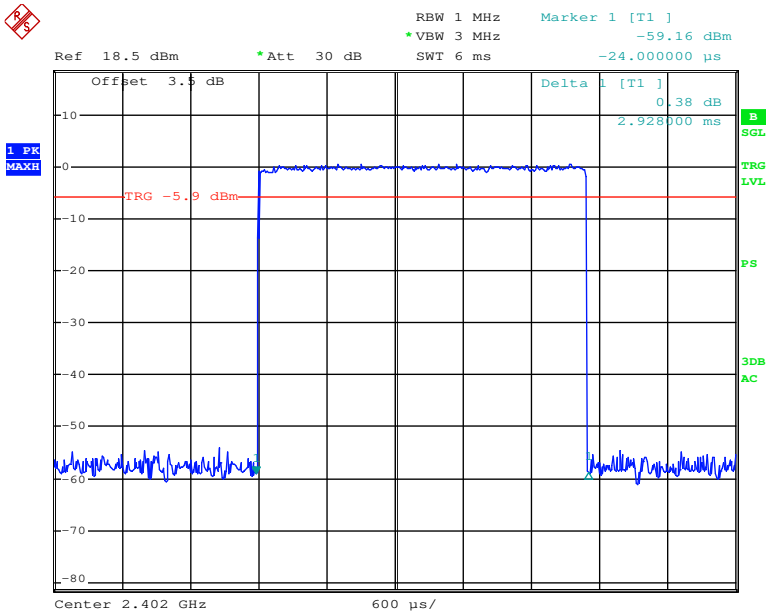
Date: 14.APR.2014 19:06:54

Pulse time, High Channel, 2DH3



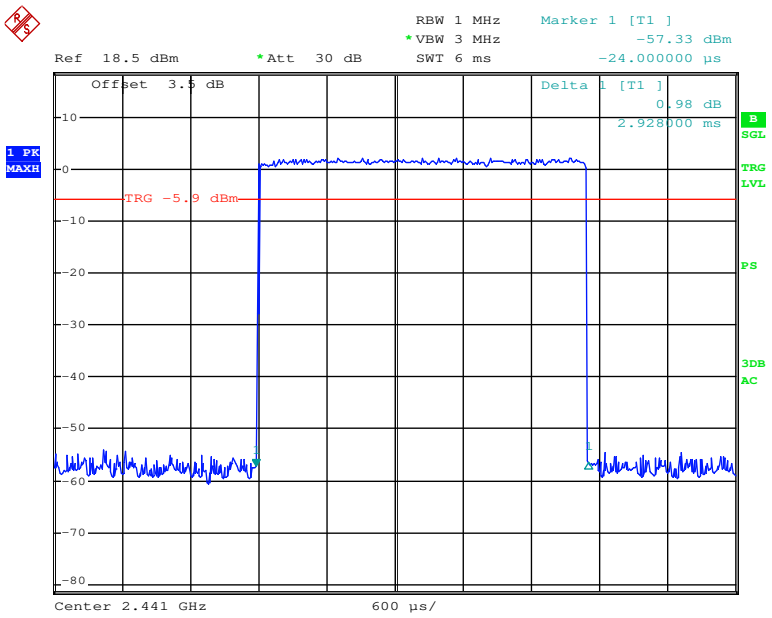
Date: 14.APR.2014 19:07:22

Pulse time, Low Channel, 2DH5



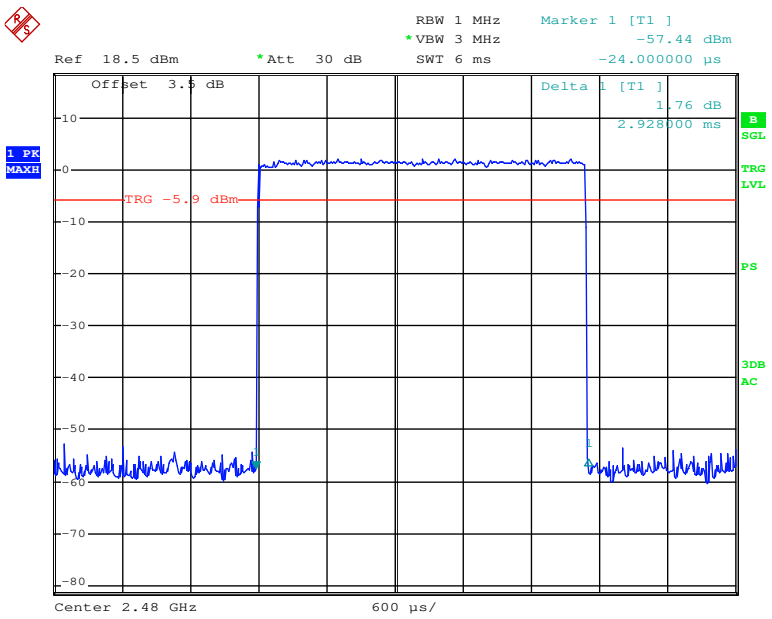
Date: 14.APR.2014 19:21:24

Pulse time, Middle Channel, 2DH5



Date: 14.APR.2014 19:19:55

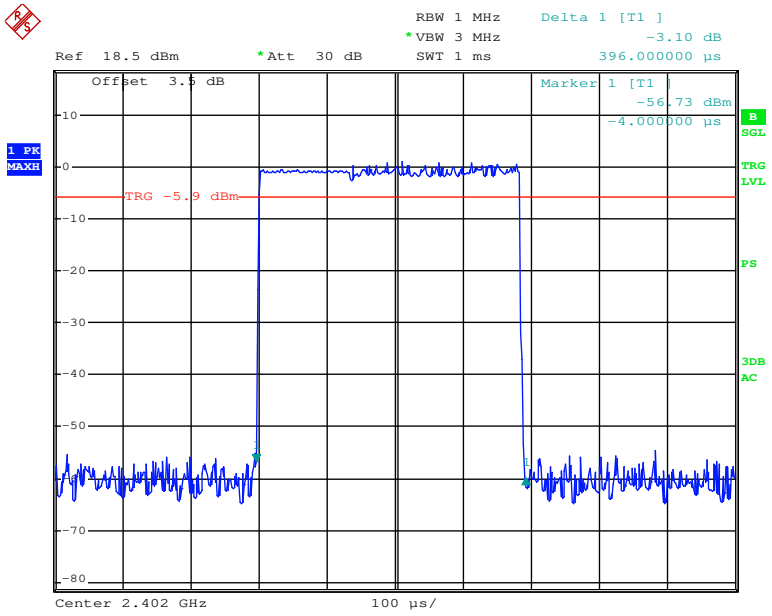
Pulse time, High Channel, 2DH5



Date: 14.APR.2014 19:19:22

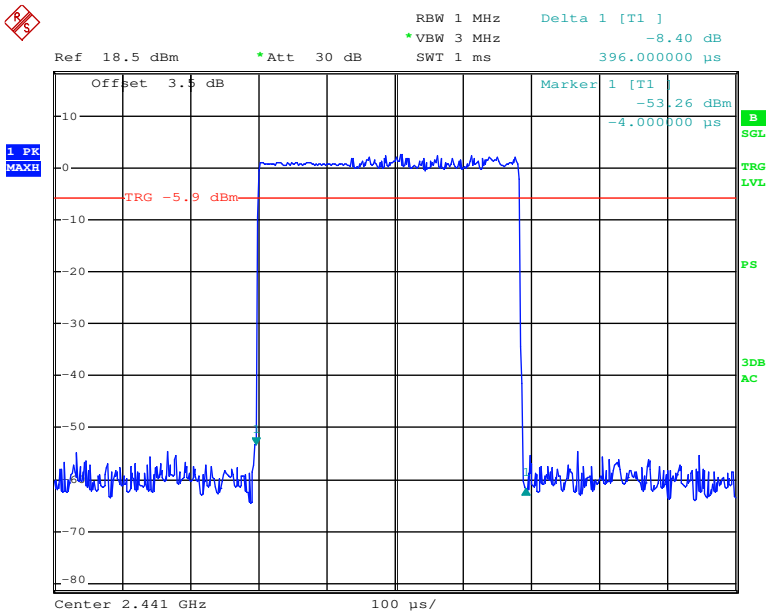
EDR (8DPSK):

Pulse time, Low Channel, 3DH1



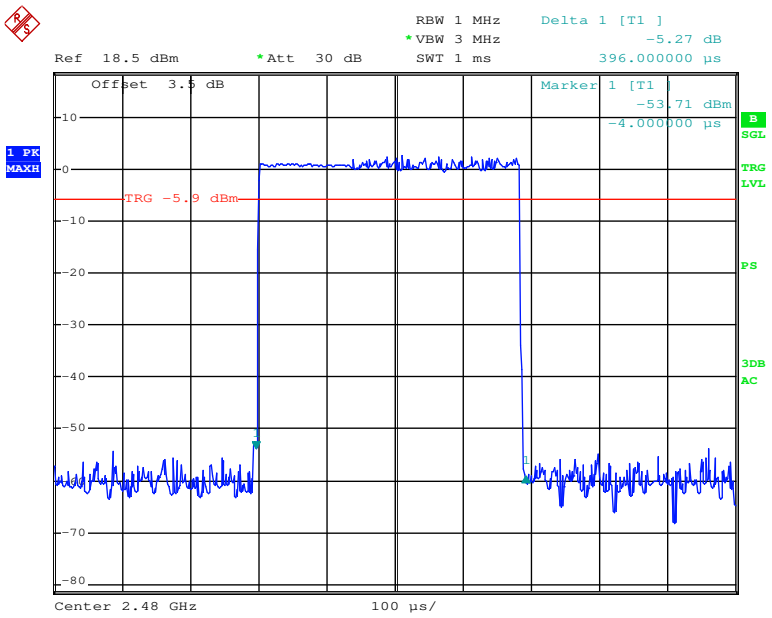
Date: 14.APR.2014 19:01:22

Pulse time, Middle Channel, 3DH1



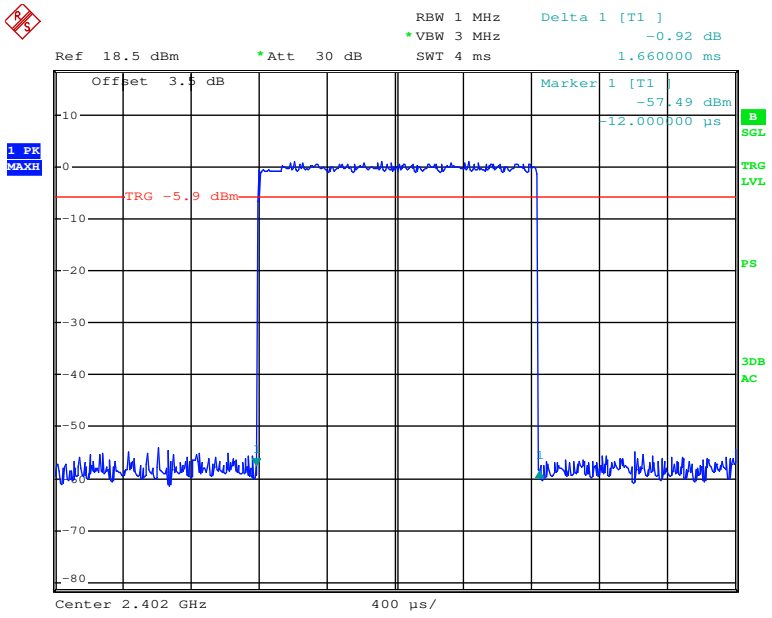
Date: 14.APR.2014 19:02:24

Pulse time, High Channel, 3DH1



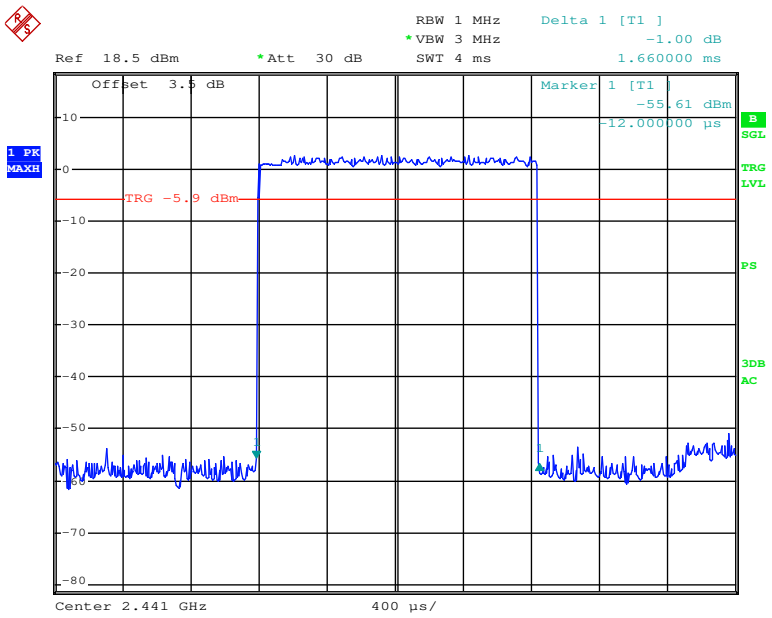
Date: 14.APR.2014 19:03:25

Pulse time, Low Channel, 3DH3



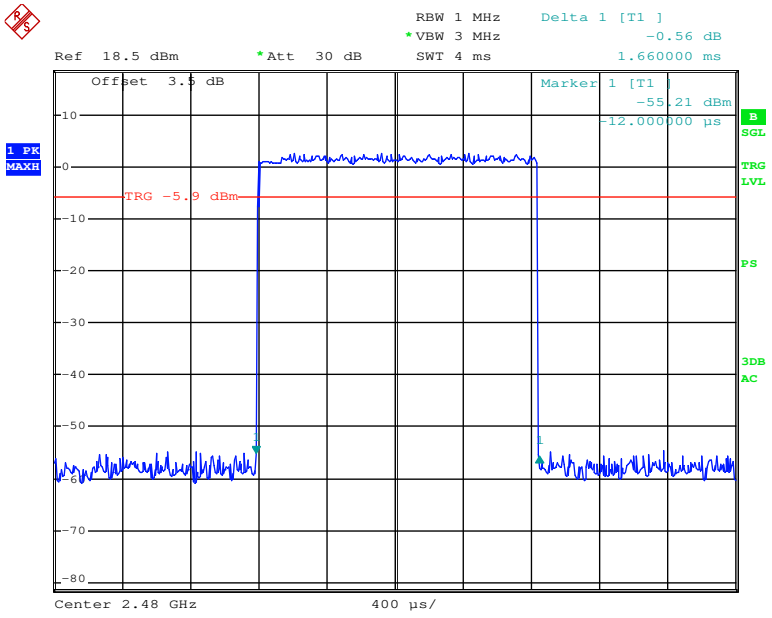
Date: 14.APR.2014 19:05:25

Pulse time, Middle Channel, 3DH3



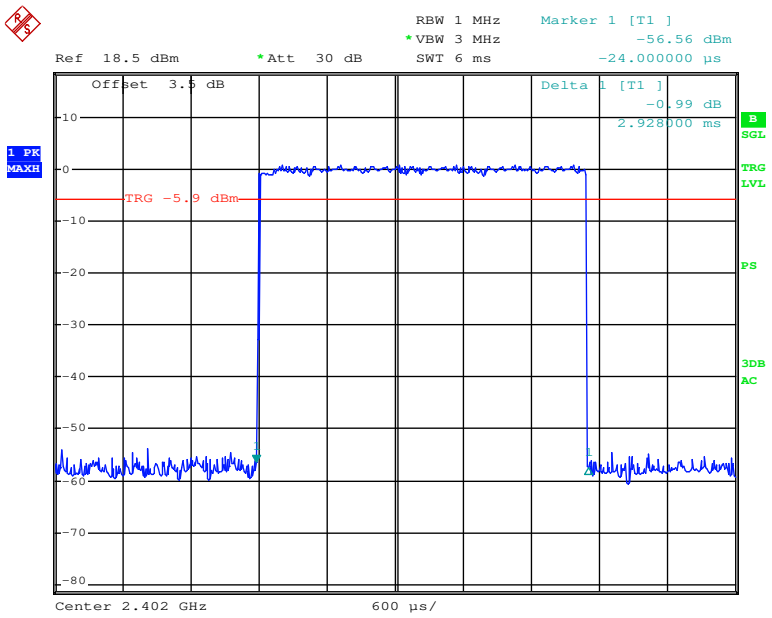
Date: 14.APR.2014 19:05:05

Pulse time, High Channel, 3DH3



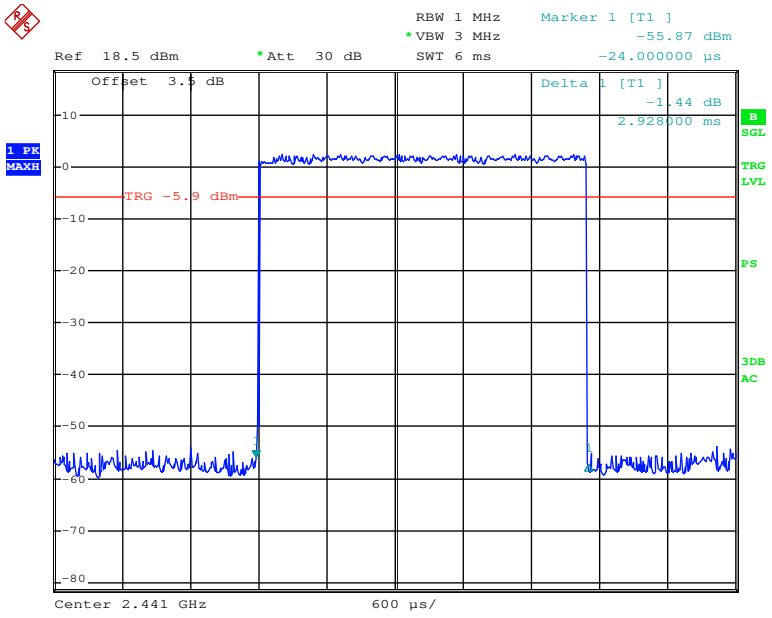
Date: 14.APR.2014 19:04:33

Pulse time, Low Channel, 3DH5



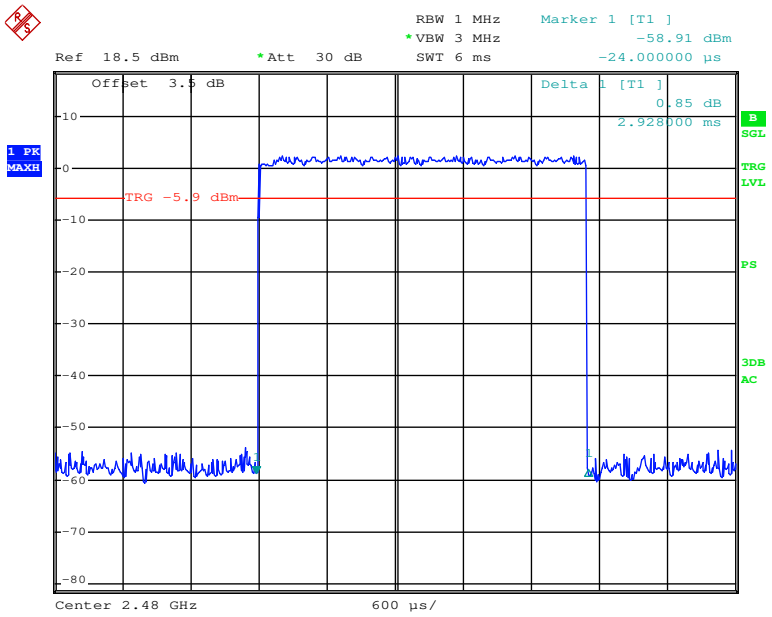
Date: 14.APR.2014 19:21:57

Pulse time, Middle Channel, 3DH5



Date: 14.APR.2014 19:22:19

Pulse time, High Channel, 3DH5



Date: 14.APR.2014 19:22:48

FCC §15.247(b) (1) - PEAK OUTPUT POWER MEASUREMENT

Applicable Standard

According to §15.247(b) (1), for frequency hopping systems operating in the 2400–2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400–2483.5 MHz band: 0.125 watts.

Test Procedure

1. Place the EUT on a bench and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to one test equipment.
3. Add a correction factor to the display.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	101122	2013-09-25	2014-09-25

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	25~26 ℃
Relative Humidity:	52~54 %
ATM Pressure:	101.0 kPa

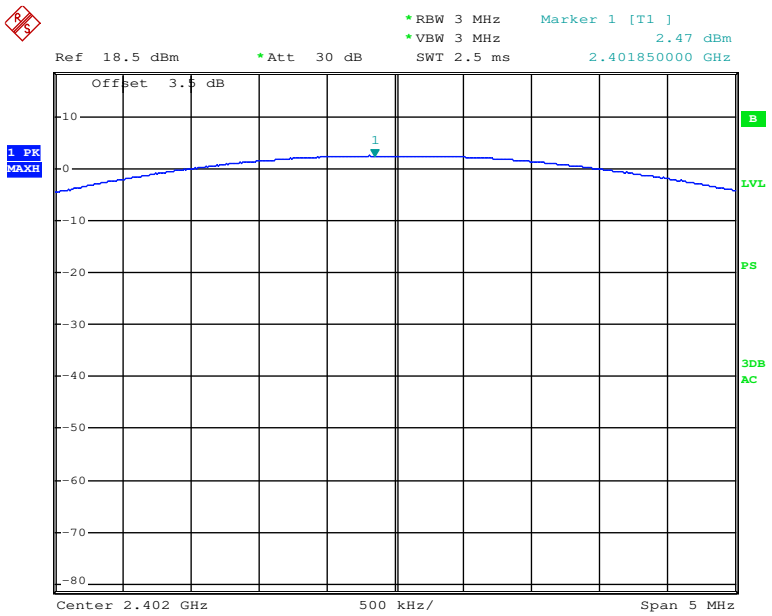
The testing was performed by Mike Hu from 2014-04-11 to 2014-04-14.

Test Result: Compliance.

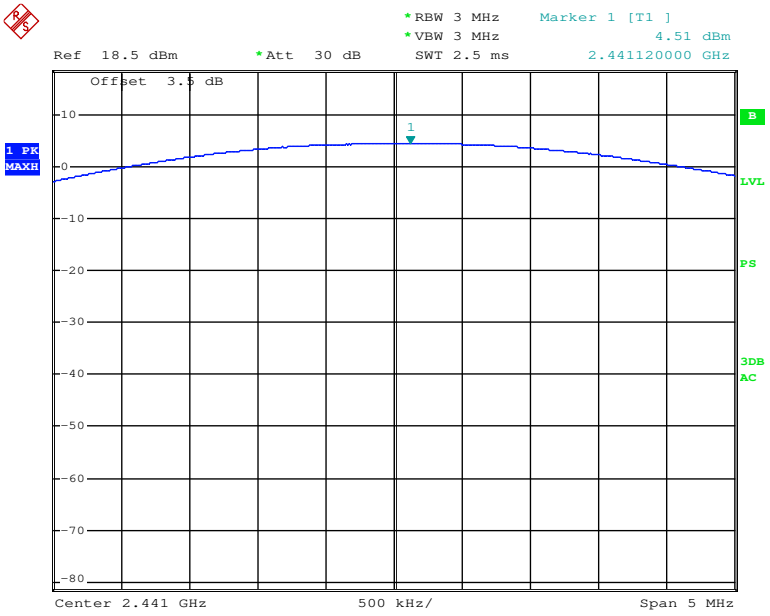
Test Mode: Transmitting

Mode	Channel	Frequency (MHz)	Conducted Output Power		Limit (mW)
			(dBm)	(mW)	
BDR (GFSK)	Low	2402	2.47	1.766	1000
	Middle	2441	4.51	2.825	1000
	High	2480	4.62	2.897	1000
EDR (π/4-DQPSK)	Low	2402	2.05	1.603	1000
	Middle	2441	3.71	2.350	1000
	High	2480	2.02	1.592	1000
EDR (8DPSK)	Low	2402	1.69	1.476	1000
	Middle	2441	3.00	1.995	1000
	High	2480	3.51	2.244	1000

BDR (GFSK): Low Channel

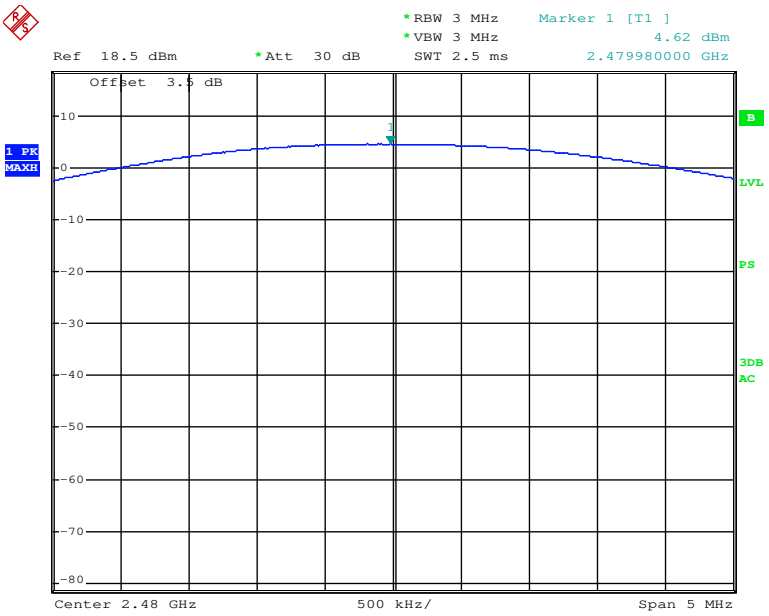


BDR (GFSK): Middle Channel



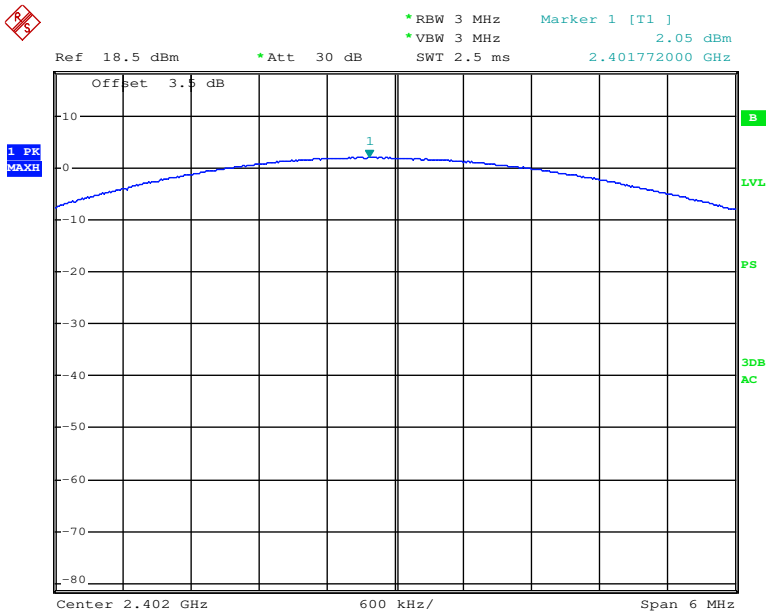
Date: 11.APR.2014 23:56:29

BDR (GFSK): High Channel



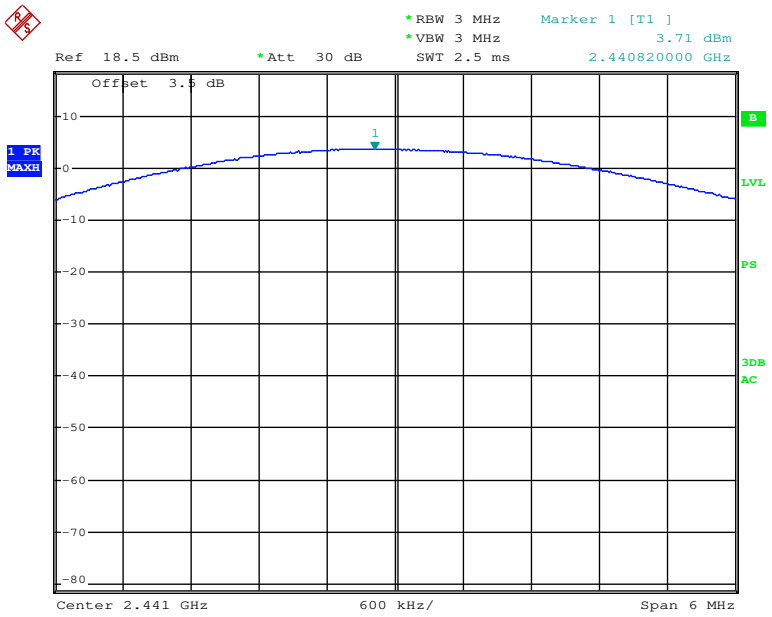
Date: 13.APR.2014 18:19:15

EDR(π/4-DQPSK): Low Channel



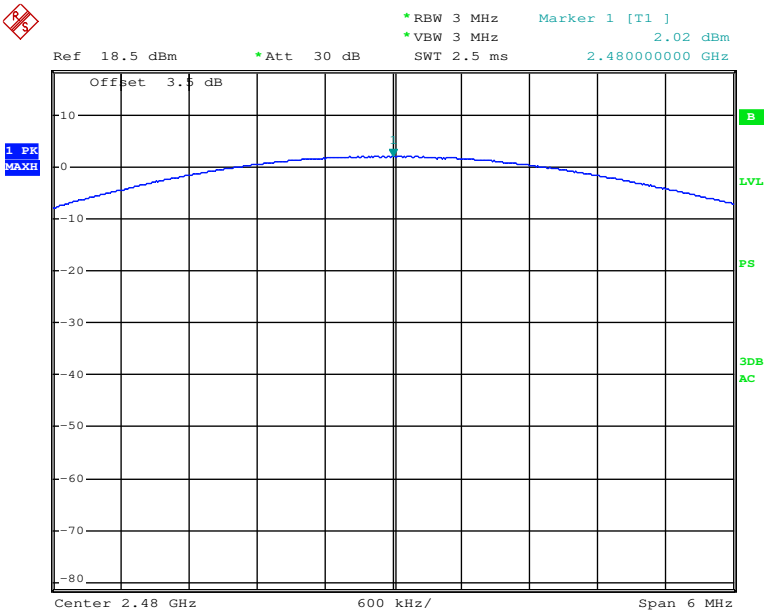
Date: 13.APR.2014 16:56:12

EDR(π/4-DQPSK): Middle Channel



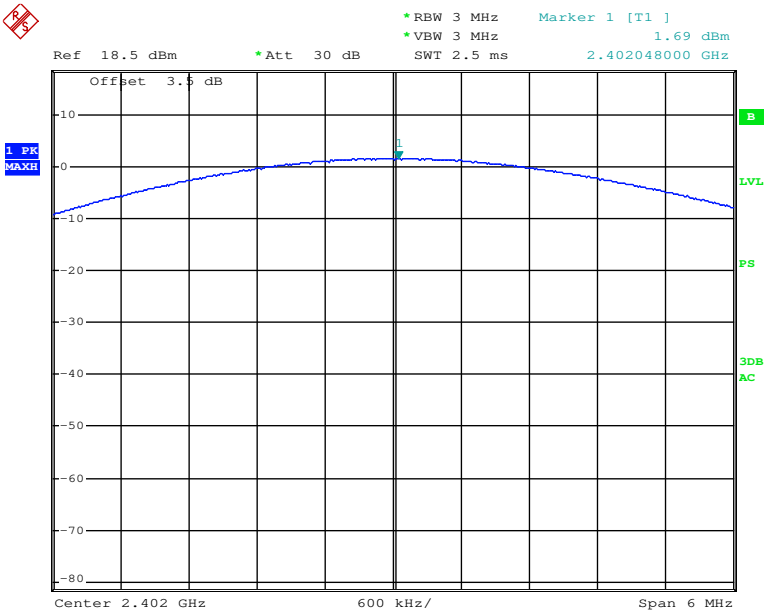
Date: 13.APR.2014 16:54:05

EDR(π/4-DQPSK): High Channel



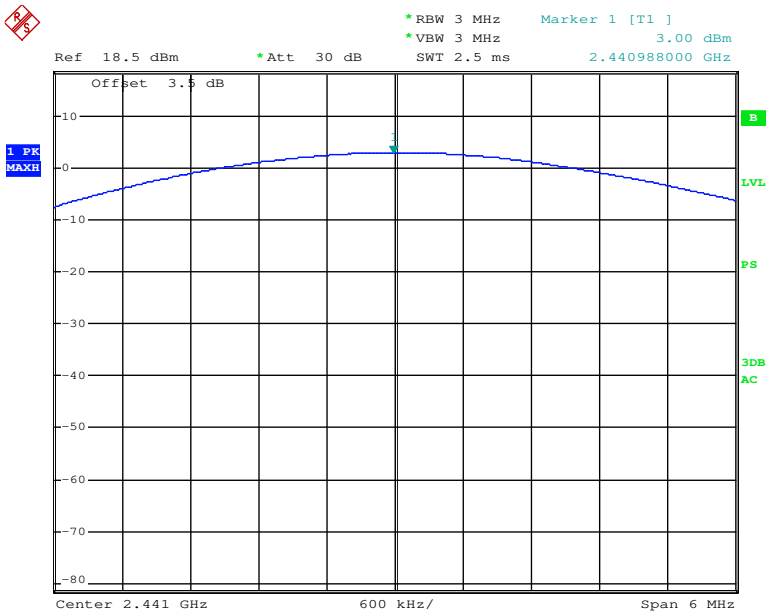
Date: 13.APR.2014 16:38:47

EDR(8DPSK): Low Channel



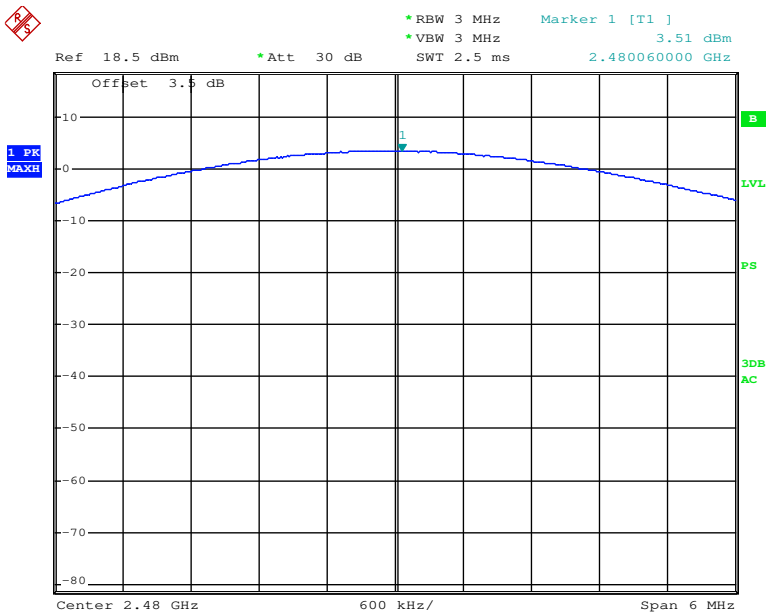
Date: 13.APR.2014 18:15:06

EDR(8DPSK): Middle Channel



Date: 14.APR.2014 19:47:55

EDR(8DPSK): High Channel



Date: 13.APR.2014 17:40:34

FCC §15.247(d) - BAND EDGES

Applicable Standard

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Put it on the Rotated table and turn on the EUT and make it operate in Operating mode. Then set it to Low Channel and High Channel within its operating range, and make sure the instrument is operated in its linear range.
3. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
4. Repeat above procedures until all measured frequencies were complete.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	101122	2013-09-25	2014-09-25

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	25 ℃
Relative Humidity:	53~54 %
ATM Pressure:	101.0 kPa

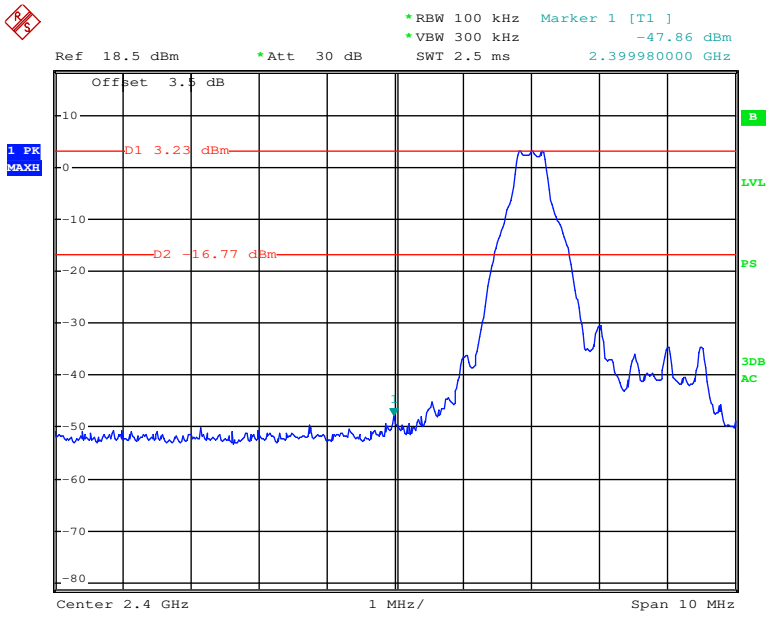
The testing was performed by Mike Hu on 2014-04-11 and 2014-04-13.

Test Result: Compliance.

Test Mode: Transmitting

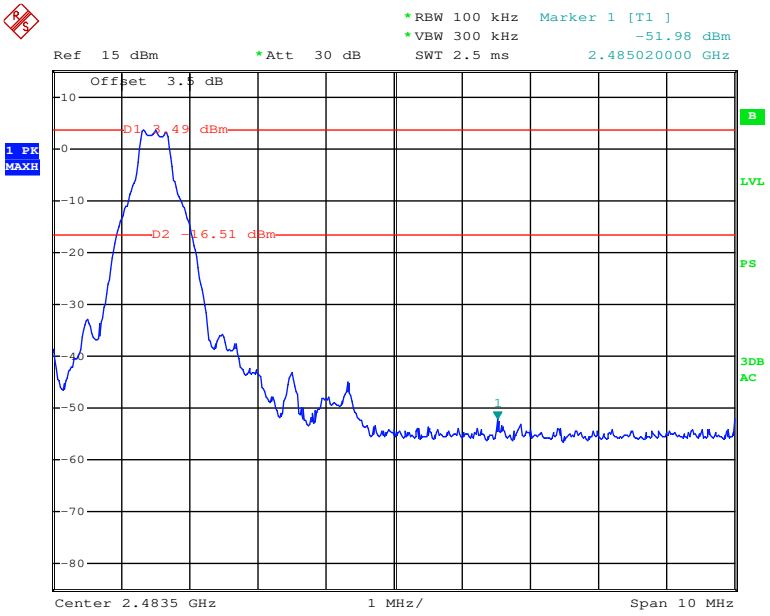
Please refer to follow plots:

BDR (GFSK): Band Edge: Left Side



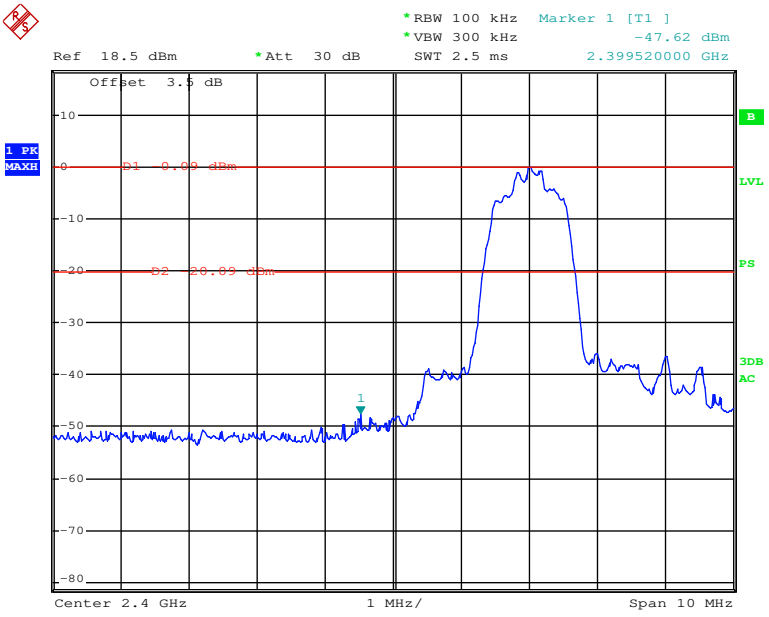
Date: 11.APR.2014 23:50:53

BDR (GFSK): Band Edge: Right Side



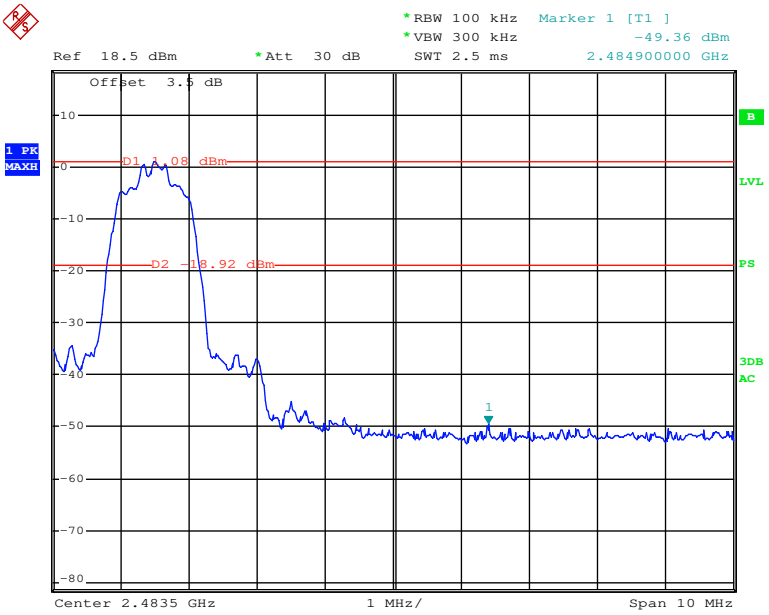
Date: 13.APR.2014 16:31:16

EDR (π/4-DQPSK): Band Edge-Left Side

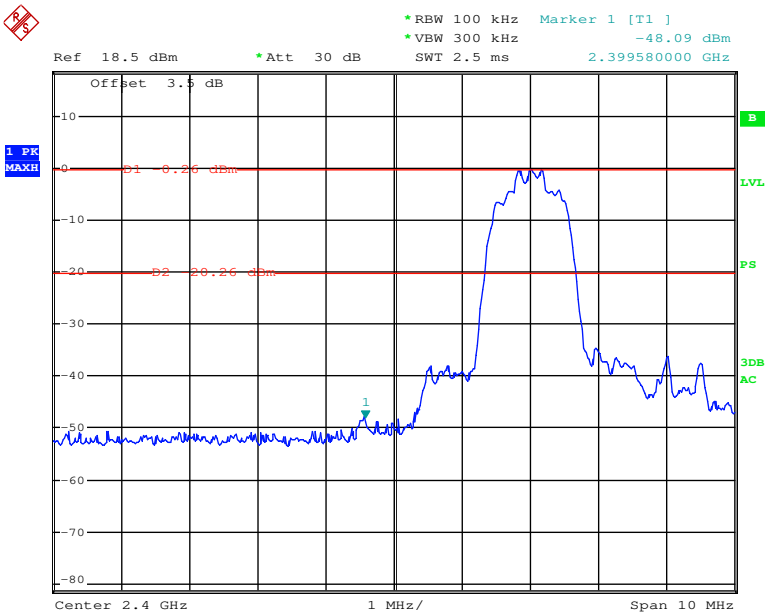


Date: 13.APR.2014 18:12:53

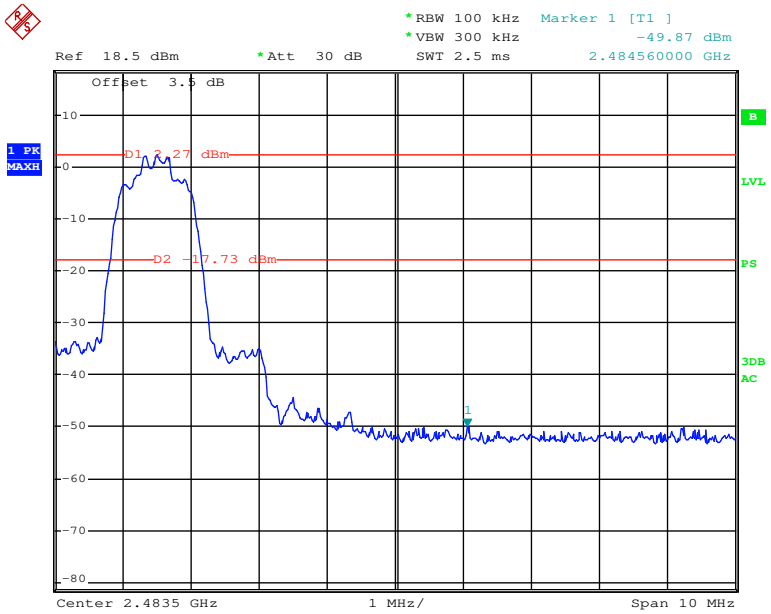
EDR (π/4-DQPSK): Band Edge-Right Side



EDR (8DPSK): Band Edge-Left Side



BDR (8DPSK): Band Edge-Right Side



Date: 13.APR.2014 17:32:59

PRODUCT SIMILARITY DECLARATION LETTER

MARLEY

The House of Marley.LLC
3000 Pontiac Trail Commerce Township, MI 48390 USA

Tel: +248 8633000 Contact : Dayna Long

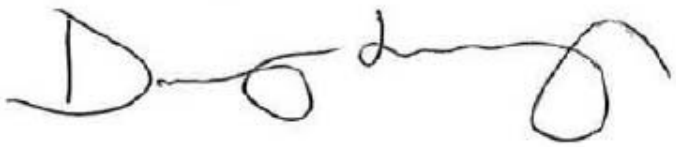
Product Similarity Declaration

To Whom It May Concern,

We The House of Marley. LLC, Hereby declare that our Liberate XLBT Model Number EM-FH041-SD, Electrically identical with the Model Number EM-FH041-MI that was certified by BACL. Both EM-FH041-SD and EM-FH041-MI are the same except the model number and appearance.

Please contact me if you have any question.

Signature:



Print Name: Dayna Long

Title: Manager

2014-05-15

***** END OF REPORT *****